East Lothian Council

REPORT: **APPENDIX TO MEMBER'S LIBRARY REPORT**

SUBJECT: **Position of East Lothian Council on the themes identified within the Scheme Notification Correspondence**

1 BACKGROUND

1.1 Musselburgh Flood Protection Scheme (the Scheme) is being promoted by East Lothian Council (the Council) under the Flood Risk Management (Scotland) Act 2009 (The FRM). Jacobs was appointed by the Council in December 2017 to develop a scheme for Musselburgh to reduce flood risk from the River Esk and the Coast. The project is being delivered in stages under PRINCE2 Project Management principles and is currently in Stage 5 which is known as 'Statutory Approvals'.

1.2 The Scheme was notified on 22 March 2024 by the Council in accordance with the FRM and the Flood Risk Management (Flood Protection Schemes, Potentially Vulnerable Areas and Local Plan Districts) (Scotland) Regulations 2010 (as amended) (the Regulations). The closing date for submission of objections and representations in respect of the EIA Report was 24 April 2024.

1.3 In accordance with Paragraph 3 of Schedule 2 of the FRM any person may object to a proposed flood protection scheme. In parallel, any person may submit a representation on the EIA. Such submissions have been termed 'correspondence' by Council. The Council's Legal Services have undertaken a process of 'categorisation' of that correspondence to determine which items were: a 'valid objection'; or an 'EIA representation'; or both; a 'non-valid objection'; or a "late objection". This process has been summarised previously by Council and a summary can be referenced in the Scheme's Newsletters dated June 2024 and September 2024, and which are publicly available via the Scheme Website at https://www.musselburghfloodprotection.com/news/newsletters/.

1.4 In due course the Council's Legal Services will prepare a report of recommendations at the conclusion of the assessment of the correspondence received during the Scheme Notifications Process. This report along with all other relevant material will then be presented to a meeting of Full Council where a Preliminary Decision will be taken. It is currently assumed that this will take place in early 2025.

1.5 In the event that not all valid objections and late objections to the Scheme are withdrawn, then in pursuance of Paragraph 5(1) of Schedule 2 to the FRM, and having considered those objections, the members of Council must make a Preliminary Decision on the Scheme.

1.6 In pursuance of Paragraph 5(5) of Schedule 2 to the FRM, and where Paragraph 5(6) applies to any person whose objection was considered, the Council must then notify the Scottish Ministers of that Preliminary Decision. Thereafter, in pursuance of Paragraph 6(2) of Schedule 2 to the FRM, the Scottish Ministers must advise the Council whether they will consider the Scheme (which would result in a Public Local Inquiry being held).

2 PURPOSE

2.1 It is recognised that the process of notifying a flood protection scheme under the FRM is a complex and legal process. This report is intended to detail the themes that have been identified within the correspondence received and to provide a clear statement of the position of the Council in relation to each of those themes. The Council does not intend to respond to specific aspects of individual objections.

3 IDENTIFICATION OF OBJECTION THEMES

3.1 It is highlighted that the numbers detailed in this report in relation to the correspondence are correct at this point in time, however as this is a live and dynamic legal process the numbers are subject to change up to the moment that a Preliminary Decision is taken by Council. The key numbers achieved through the process of categorisation of the correspondence undertaken by Council's Legal Services are:

a) 470 persons who will become Relevant Objectors when a Preliminary Decision is taken;

b) 465 valid objections against the Proposed Scheme;

c) 5 late objections against the Proposed Scheme; and

d) 13 representations on the EIA Report.

3.2 Once the correspondence was categorised it was required to assess the correspondence received. In order that this was achieved Council's Legal Services worked with the Scheme's Project Team to determine the themes contained therein. Jacobs assessed all correspondence provided to them by the Council's Legal Services and identified seventy-one distinct themes. This document sets out the themes that have been identified and presents the position of Council to each of those objection themes.

3.3 Through a process of assessment, 71 themes have been identified from within the correspondence. These are all detailed in Section 4 of this report, along with the position of Council in relation to each of these themes.

3.4 These themes are considered to represent all key points delivered to Council through the submitted correspondence. It is highlighted by this report that Council understand that there will always be a degree of subjectivity to the determination of individual themes. However, it is considered that the essence of all messages presented through the correspondence received have been identified and assessed.

3.5 The number of objectors who identified each specific theme has not been recorded in this report. It is intended that this information will be given to members of Council in due course, to ensure they have all relevant information available when they discharge their responsibilities under the FRM through a Preliminary Decision. Thereafter this information will also become publicly available. Such quantification of the number of objectors who identified each theme (i.e. a system of ranking) is not considered relevant to this report.

4 COUNCIL POSITION ON OBJECTION THEME

4.1 **Project Governance**

a) It is understood that some people have concerns around the Scheme's Project Governance. In terms of the Project's Governance of the Scheme an internal audit review was carried out by Council to ensure that the Project Governance remained robust and appropriate. A report on the outcome of this audit was taken to Council's Audit and Governance Committee on Tuesday 17th September 2024 and can be reviewed through this link under Item 2: Agendas, reports and minutes | East Lothian Council.

b) It is considered that the Scheme has established a robust system of Project Governance and that this has evolved as the needs to the project have changed over time. It is assumed that this will continue to be the case. The authority of the Project Executive and Project Board to advance this project has been deriving from the authority of Council's Cabinet since May 2016 and from Full Council since August 2022. This system of governance is detailed on the Scheme Website at https://www.musselburghfloodprotection.com/project/project-governance/.

c) In addition to the overall governance points raised, there have also been concerns raised about the authority of Council's Cabinet to approve both the 'Preferred Scheme' at the end of Project Stage 2 and the start of the Scheme's Project Stage 3 (known as 'Outline Design') in January 2020: link (Agendas, reports and minutes | East Lothian Council). At that time the decisions required conformed to the authority of Cabinet as the proposals were at a strategic level. It is highlighted that later decisions were then taken to meetings of Full Council to ensure that developments through the Outline Design Stage were taken by all members of Council i.e. the project had moved from strategic to detailed and specific.

d) Council has followed the processes set out in the FRM. The Scheme has been published in line with the requirements of the FRM and there is no requirement to provide all of the detailed evidence of upon which the Scheme is based to the general public. The Scottish Government and SEPA identified Musselburgh as a priority flood risk area, which propelled the initial action for this Scheme through the Forth Estuary Flood Risk Management Strategy, published in December 2015. In addition, Council has engaged professional engineering consultants to advance all technical aspects of the Scheme, and many of these activities have been reviewed or supported by SEPA, NatureScot, Historic Environment Scotland, Dynamic Coast, and other regulatory organisations.

e) Further, the FRM states that the Local Authority advancing a flood protection scheme must take decisions in accordance with the legislation, unless such responsibilities move to the Scottish Ministers. In each Local Authority that responsibility will reside with the elected members unless an appropriate scheme of delegated authority has been established thereby transferring the means of discharging the decision (e.g. a committee). In East Lothian Council no such alternative committee exists. The Elected Members are able to request and ask for all relevant information required to make an informed decision on the Scheme.

f) Contracts for the Project Management Services and the Design Consultancy Services were undertaken in accordance with the Standing Orders of Council and in accordance with Procurement Regulations (including Procurement Reform (Scotland) Act 2014, the Public Contracts (Scotland) Regulations 2015 and the Procurement (Scotland) Regulations 2016.

g) Finally some people have raised concerns about the competency of the Elected Members of Council to take informed decisions about this project. This concern is not considered one that should reasonably be directed at the Proposed Scheme. The FRM is an Act of the Scottish Parliament, and this legislation clearly defines the approach to be taken in advancing a flood protection scheme, and the decisions that must be taken and by whom. The key decisions to confirm a Proposed Scheme are taken by the Local Authority unless as dictated by the FRM these are then required to be taken by the Scottish Ministers. In advance of any Council meeting requiring Councillors to make determination on the Scheme, all Councillors are provided with all necessary information and technical advice to allow members to make a clear and informed decision. All members will be presented with the Scheme documentation, technical advice and all objections deemed valid or accepted as late.

h) The Scheme has at all times abided by the requirements of the FRM and provided the members of Council with all relevant information, and / or other information requested by them, such that they undertake their responsibilities of office and the specific responsibilities as detailed by the FRM.

4.2 **Scottish Government Policy and Funding**

a) It is understood that a number of people have raised concerns regarding Scottish Government Policy and how the Scheme is proposed to be funded. Some of these concerns specifically identify that the current government funding criteria incentivises higher capital expenditure. Firstly it is highlighted that from the perspective of this as a policy failure that this concern must be directed to the Scottish Government and not to East Lothian Council / the Scheme. This report records that against every financial metric and on every occasion of audit, or reporting, that the Scheme has complied in full with all Scottish Government financial criteria and also with other legislative, regulatory, licencing etc. requirements. That said, it is understood that this concern may also be directly concerned that East Lothian Council had developed this Scheme to maximise the

grant funding invested in Musselburgh. This report considers it necessary to directly address such concerns, and to highlight that there is no evidence that this is the case. The cost of the provision of flood protection to Musselburgh has increased but that is due to definable changes that are addressed elsewhere in this report, and it is considered that the Scheme has a robust business case and that the investment in Musselburgh is justified.

b) The Scottish Government have a long-term programme (known as Cycle 1) with criteria for funding flood protection schemes. Musselburgh was defined as priority number 11 on that list. In 2023 a new recommendation detailed that Cycle 1 schemes much achieve Scheme Notification before 31st March 2024. Some objectors stated that this new recommendation incentivised not pausing the Scheme. Council wish to highlight that this was a matter that had been put before a meeting of Full Council in January 2024 and they determined to approve progression of the Scheme. There was significant discussion about this matter, including the consequences of such a pause, before a decision was taken. It is considered that the Elected Members at that meeting considered the merits of pausing the Scheme and with full information available to them they determined that the Scheme should be progressed, notified, and consulted upon – i.e. that it should not be paused.

c) Some people have raised a concern that the Council should have waited until the Flood Resilience Strategy was published before advancing the Scheme. That strategy was consulted on between 20th May 2024 and 13th August 2024. This consultation timeframe was not known to Council officers at the time the Scheme was published. There remains no publication date for the strategy. It is highlighted that over the duration of the development of a major project like this Scheme that there will always be the risk of a new strategy or set of guidelines being published. This risk is not considered a reason to delay the advancement of an existing defined project or objective. In this instance it is worth highlighting that the Flood Risk Management Plans and the Local Flood Risk Management Plans (Forth Estuary) identify Musselburgh as a flood risk area and define a requirement for a flood protection scheme for Musselburgh – and that this has been the case since 2015.

d) Some people also raised concerns about a potential increase in Council Tax arising from (assumed) future cost increases (of the Scheme). It should be pointed out that Local Authority funding is not solely made up from Council Tax. The capital funding component of the Council's budget is made up from a number of sources (see Scottish Government Guidance: Local government capital - Local government - gov.scot

(www.gov.scot)). It is highlighted that Council Tax accounts for around 25% of the income received by Council. No Council Tax freeze has been announced for year ending 2025/26 (although the Scottish Government haven't confirmed there won't be one either). Currently the financial planning assumptions are for a 10% increase next year and 5% annual increases in the subsequent 4 years, that is in the public domain. The absence or presence of financial commitments associated with the Scheme will not change the financial metrics associated with Council Tax.

4.3 **Independent Review of the Scheme**

a) It is understood that some people have raised concerns regarding the lack of an independent review of parts of the Scheme. These include: the Scheme's hydraulic modelling; its approach to climate change; its options appraisal; its EIA, and its economic appraisal. Implicit within this theme of objection was the perception of a bias towards developing a Scheme that was unnecessary, disproportionate and / or commercially advantageous to the consultants.

b) This report highlights that Musselburgh has a flood risk, and that this flood risk existed long before the current project commenced to deliver a flood protection scheme. The origin of the project is dealt with elsewhere in this report; however it needs to be reiterated that the Scheme in its current format emerged from the National Flood Risk Management Plans published by SEPA in 2015 based on work undertaken through their flood models. All of this predated the current project. The decision to advance this Scheme was taken by East Lothian Council's Cabinet in 2015. Only then did the current project come into existence. All of this predates the consultants currently engaged on delivering this Scheme for Council.

c) The Project Management Services and the Design Consultancy Services were both tendered in accordance with the Council's Corporate Procurement Procedures, which has been dealt with through the Project Governance theme in this report. The Council through its systems of governance runs the project and the external consultants take instruction directly from the Project Board, which is established by Council officers and in turn takes its authority from meetings of Full Council. It is considered fair to state that working on the project is commercially advantageous to external consultants as they are providing a service and it is reasonable to expect that they be appropriately reimbursed for delivering such services: however the

Council do not consider it reasonable to suggest that it is allowing any external organisation to dictate the terms of their contract to the detriment of the defined objectives of the Scheme and / or the policies of the Council.

d) The Scheme also brings in specialist support as required. This is achieved through the Project Management and Design Consultancy Services that have been procured for the Scheme. It is also achieved by the many other procurements that have been undertaken to date to provide other services to the Scheme's development. It is not considered reasonable to assume that each professional organisation needs to have their work and / or outputs independently checked. These organisations have their own internal Quality Control Systems.

e) Within this theme it is worth noting that some of the most significant individual productions of the Scheme to date have been flagged as requiring independent review. Each of these is individually a major piece of work. They are however all just individual parts of a much larger, ongoing, iterative, consultative stream of workload that has taken place over nearly 8 years. This whole body of work, including all its individual parts, has been subject to professional development by industry experts who were procured through relevant processes, and who are managed by officers of the Council. Along the journey this work interacted with many regulatory organisations and their specialists, and is developed under all appropriate legislation, regulation, and guidelines. Elsewhere in this report there are themes and Council positions on the following themes: the options appraisal process; the approach to climate change; the hydraulic model. It is considered that these should also be read in conjunction with this theme.

f) Finally, the Council would like to highlight that it costs a lot of money and time to develop key productions. Similarly undertaking independent expert reviews is costly and time consuming. Council is committed to advancing all projects in the most cost effective and efficient manner, and without evidence of the need for independent review then it would not be reasonable or proportionate to commission such additional work.

4.4 **Evolution of Scope**

a) Concern has been raised about the increased scope of the project. This concern is fundamentally related to the Scheme's estimated cost

and its affordability to the Council. It is also related to concerns about the Council's capacity to invest in other services and infrastructure.

b) The primary objective of the project is to reduce the flood risk to Musselburgh from a major flood event, and thereby all smaller flood events up to that standard of protection. This objective has not changed over the duration of the development of the project. What has changed is the understanding of both the level of flood risk to Musselburgh today, and to the scale of increase in flood risk that can be expected by 2100, due to climate change. The scope and scale of the flood risk reduction requirements that are needed to reduce this risk has therefore increased.

c) The scope of the project evolved as new information became available. When Musselburgh's flood risk was assessed in 2015 by Kaya Consulting, the latest data available in relation to the effects of climate change was the '*United Kingdom Climate Projections 2009'* (UKCP09), and the associated Scottish guidance from SEPA *'Climate change allowances for flood risk assessment in land use planning'* (version 1). During the development of Musselburgh's more detailed flood model by Jacobs between 2019 and 2021, new data became available, in the form of the '*United Kingdom Climate Projections 2018'* (UKCP18), and the associated Scottish guidance from SEPA *'Climate change allowances for flood risk assessment in land use planning'* (version 2). SEPA's guidance was later revised to version 3. The new data had the effect of increasing the flood risk as a result of climate change, particularly on the coast.

d) The Scheme was advanced through a consultative framework. This involved engaging with key stakeholders and the people of Musselburgh at key points in time throughout the development of the design. The approach of the project changed because of that process of engagement. As a specific example: further to Public Exhibition No. 1, held in summer 2019, the design evolved to include a debris trap upstream of Musselburgh, and the proposal to modify two Scottish Water Reservoirs in the South Esk Catchment (that will store water during a storm event). These may appear to be additional work scope but whilst they are indeed additional pieces of flood risk reduction infrastructure within the Scheme, they achieve an outcome of reducing the scale of the flood defences (walls and embankments) required in Musselburgh. As such they can be considered to be overall neutral in relation to scope change.

e) This report highlights that Council understand that the perception that the scope of the project has increased significantly is mostly centred around the design work undertaken through the Scheme to achieve multiple benefits in Musselburgh. Council has been advancing three separate projects in Musselburgh: (i) the Scheme; (ii) the Musselburgh Active Travel Network ((MAT); and (iii) a project to repair the Ash Lagoons Seawall. At key locations, and over many kilometres of length, these individual projects share one footprint on Musselburgh's landscape. They also have different objectives relating to pieces of existing infrastructure: e.g. both the Scheme and MAT have an objective associated with the Shorthope Street Footbridge. Both wish to remove the existing footbridge, but it is for different reasons. Under authority deriving from Council, the Scheme's Project Team developed one holistic design that could achieve the outcomes of all three projects during the Scheme's design development. It is considered that this presents the best opportunity for Musselburgh to end up with a new landscape that works in the best possible way for the people of the town, the local environment and within the context of the town's rich cultural heritage.

f) Finally, the scope of the project evolved as a consequence of the Scheme's EIA. The scoping of the EIA and its methodology was influenced by consultative bodies, including NatureScot, Historic Environment Scotland (HES), Scottish Environment Protection Agency (SEPA), Scottish Water, Forth District Salmon Fishery Board and the Council's Planning Service. As the outline design was developed, the EIA identified potential significant effects and recommended design changes and the inclusion of mitigation measures. For example, the form and position of defences were changed in some locations to reduce the impact on trees and biodiversity. As another example, the use of stone cladding was identified as a means of reducing visual impact and impact on heritage within the conservation areas.

g) In summary, the dynamic nature of flood risk management means that scope change on a project of this scale and complexity is likely, if not inevitable. This has been in response to the availability of new data, the identification of new opportunities for multiple benefits, and the need to appropriately mitigate the Scheme's environmental impact. In all instances, changes in scope have been managed through the Scheme's governance and change management process. In all instances, the decision to change the scope of the project has been taken by the Council's elected members following the recommendations of the project team.

4.5 **Option Appraisal**

a) Some objections suggested that the option appraisal process failed to sufficiently consider alternative solutions, particularly Natural Flood Management. Some asserted, albeit without providing any evidence, that Jacobs was biased in favour 'hard engineering' options and that this was because they stood to make more money from such a Scheme.

b) During Stage 3 of the project, the Council led a series of option appraisal workshops to consider different ways of achieving the desired reduction in flood risk in Musselburgh. During this process, input was provided by Council officers from relevant service areas, specialists from Jacobs Design Consultant, and from both Turner & Townsend and CPE Consultancy who are part of the Project Management Team, and representatives from consultative bodies such as SEPA, NatureScot, and Historic Environment Scotland. The process was conducted in accordance with Scottish Government guidance and industry best practice.

c) The initial brainstorming identified 96 potential options for consideration. The participants, with their collective professional knowledge and expertise, then appraised this 'long list' in terms of the economic, technical, environmental, social, and health & safety considerations of each option. Subsequently the long list was refined into a short list, and ultimately led to a preferred combination of options, known as the 'Preferred Scheme'. The Preferred Scheme Report, which records this process, and is available on the Scheme's website, was presented to Council's Cabinet in January 2020 and subsequently accepted.

d) The acceptance of the Preferred Scheme enabled the outline design and associated consultation to commence in February 2020, and this continued for four years until January 2024. Notwithstanding the outcome of the options appraisal, the Council was clear that, during the development of the outline design, it might be appropriate to reconsider any of the long list options previously discounted if new information came to light which demonstrated those options to be capable of achieving the desired project outcomes.

e) In summary, it is considered that a comprehensive options appraisal was conducted by a diverse group of qualified and experienced professionals, resulting in the most appropriate combination of options being selected to form the Scheme. Jacobs was only one of many organisations participating in this, and the Council ultimately chose which options would be included. The Scheme is considered to be the best way of reducing flood risk to Musselburgh while delivering reliability, value for money, and

minimising sources of uncertainty. That holistic combination of options comprises:

i. **attenuation** through the sustainable re-use of existing reservoirs in the catchment;
ii. **debris management** to reduce the risk of bridge blockage;
iii. **conveyance improvement** through replacement of selected bridges;
iv. **containment** through the use of physical defences; and
v. **surface water management** through the use of pumping stations.

4.6 **Flood Risk Assessment**

a) It is understood that some people have concerns about how Musselburgh's flood risk was assessed, and whether the flood maps which were presented to the town are accurate, and whether the flood risk was overstated to justify the Scheme.

b) Musselburgh has a risk of fluvial flooding from the River Esk and the Pinkie Burn, coastal flooding from the Firth of Forth, as well as groundwater flooding and surface water flooding. Notwithstanding this, the last major flood in Musselburgh was in 1948. It is recognised that the lack of major flooding in recent years may have influenced people's perception of Musselburgh's flood risk.

c) Prior to the Scheme, SEPA conducted a national flood risk mapping exercise. SEPA's floods maps are available to view online at https://map.sepa.org.uk/floodmaps. In 2017 the Council commissioned Jacobs to develop a flood protection scheme for Musselburgh. A detailed topographic survey was carried out and used by Jacobs to create a new, independent, and more detailed flood model of Musselburgh. The results of the Jacobs flood model were broadly consistent with those of SEPA's model. Between 2019 and 2022, Jacobs' flood model was revised on several occasions to reflect newly published climate change projections, and updated SEPA guidance. Finalised flood risk maps from Jacobs' analysis were presented to a meeting of Full Council in October 2022 and subsequently accepted.

d) It is considered that the flood risk maps produced for the Scheme are an accurate representation of Musselburgh's current flood risk and the effect that climate change could have on increasing that flood risk in the future. The flood model used to develop the Scheme used the best available data, the most up-to-date guidance, and was consistent with the flood model independently developed by SEPA.

4.7 **Standard of Protection**

a) It is understood that some people feel the Scheme's proposed standard of protection is too high, that the likelihood of such an extreme event occurring is too low to warrant action, and that a lower standard of protection with smaller defences should have been selected instead.

b) Musselburgh has a history of flooding, with the last major flood occurring in 1948. An earlier major flood occurred in 1891, and smaller floods have occurred more recently in 1966 and 1990. The event in 1948 was calculated to be a 1 in 200-year event. It is recognised that since there have been no major floods in recent years, some people may therefore believe that the risk to Musselburgh is small, and that protecting against a seemingly unlikely event is not necessary.

c) Flood risk is characterised in terms of its probability (how likely a flood of specific magnitude is to occur) and consequence (the number of properties flooded, or damages incurred). A flood event with low probability and high consequence can therefore have the same level of risk as an event with much higher probability but lower consequence. This means that whilst a 1 in 200-year flood (otherwise known as 0.5% Annual Exceedance Probability, or AEP) may seem unlikely to occur again soon, the damage that such an event would cause if it did occur can still justify protecting against it. A flood event of this magnitude could occur at any time and is not just a risk for the distant future.

d) In December 2015, following a national flood risk mapping exercise conducted by SEPA, Musselburgh was designated as 'Potentially Vulnerable Area 10/21' within their Flood Risk Management Strategy for the Forth Estuary Local District Plan, and the Scheme was ranked 11th out of 42 in terms of priority schemes across Scotland. The strategy identified an action to provide a flood protection scheme for Musselburgh with a 1 in 200-year standard of protection. Development of this was subsequently allocated funding on cycle 1 of the Scottish Government's national flood risk management programme.

e) In December 2017 the Council commissioned Jacobs to develop a Scheme for Musselburgh. At the outset of that commission, the Council established thirty-three project objectives, one of which was to, "aspire to meet a level of protection to protect against a 0.5% AEP (which is known at the 1 in 200 Years Flood Event), plus an allowance for climate change flood event".

f) During the outline design stage of the Scheme Jacobs assessed the flood risk to Musselburgh from flood events ranging from 1 in 2-year to 1 in 1000-year return periods (50% AEP and 0.1% AEP respectively). It was subsequently determined that delivering a Scheme with the optimal 1 in 200-year standard of protection was technically, environmentally, and economically achievable.

g) Notwithstanding the Scheme's chosen standard of protection, and irrespective of which standard had been chosen, Musselburgh will always have a residual flood risk. As an example, in October 2023 Storm Babet caused the River South Esk in Angus to overtop flood defences in Brechin, flooding over 400 properties. That flood protection scheme was designed to protect against a 1% annual exceedance probability (AEP) or 1 in 100-year flood event plus an allowance for climate change.

h) It is recognised that some people view the event in Brechin as evidence that flood protection schemes don't work. However, wherever action is taken to reduce flood risk, there will always be a chance of a larger flood event than defences were designed for. This does not mean that those defences have failed. Failure is when a scheme does not protect against the magnitude of flood event it was designed for, whereas exceedance is when a larger flood event occurs.

i) In summary, it is considered that there is a real and present risk of flooding in Musselburgh. This is supported by independent analysis conducted by SEPA and approved by the Scottish Government. On that basis, protecting against a 1 in 200-year flood is justifiable, deliverable, and proportionate to the level of risk which exists, and the resulting residual risk is considered tolerable. Whilst people will have differing views on this, the Council nevertheless has a statutory responsibility to address flood risk. This applies not only in the short term for today's community but also in the longer term for the generations of residents to come.

4.8 **Allowance for Climate Change**

a) Whilst almost all the correspondence acknowledged that climate change is real, some people felt that there was still too much uncertainty surrounding the rate and magnitude of climate change and its effects on flood risk. Some believed that the chosen allowance was too pessimistic, and that the Council should wait to see what action was taken globally to reduce carbon emissions.

b) With respect to flood risk in Musselburgh, the Council considered not only the risk which exists today but also how that risk might change over time.

It is a fact that global mean temperature is rising, and that climate change will result in higher sea levels, greater rainfall intensity, and increased river flows. These effects will, over time, increase the risk of flooding to communities located on floodplains and near the coast.

c) In the context of flood risk, the most pertinent questions about climate change relate to how much and how quickly the climate might change. This has been investigated at an international level through the United Nations' Intergovernmental Panel on Climate Change (IPCC) and interpreted at a national level through the United Kingdom Climate Projections (UKCP), with further guidance provided at a devolved level in Scotland by SEPA. These all informed the view that, without significant international action to reduce greenhouse gas emissions and thereby avert climate change, flood risk in Musselburgh is likely to increase to some extent during the 21st Century.

d) It is considered that waiting to see how much climate change occurs before beginning to implement a flood protection scheme is not an appropriate strategy. Developing a flood protection scheme (or modifying an existing one) could take many years to deliver, and there is a risk that flooding occurs before this is complete. It is therefore considered appropriate to include an allowance for climate change within the Scheme currently proposed. If necessary, this allowance can then be added to later as part of a managed adaptive approach.

e) While developing the Scheme, and in light of the likelihood of increased flood risk to Musselburgh over time due to climate change, the Council considered a number of different climate change scenarios. These scenarios were in recognition of the uncertainties surrounding climate change and varied from 0m to 0.86m rise in sea level, 0% to 56% increase in peak fluvial flow, and 0% to 39% increase in peak rainfall intensity. The required height of defences to protect against each scenario was then considered. In October 2022 at a meeting of Full Council the Scheme's Hydraulic Model version 'C' was reviewed and accepted as Musselburgh's flood risk. A range of climate change scenarios that the Scheme's allowance for climate change would come from was also accepted by that meeting.

f) The allowance for climate change included in the Proposed Scheme, is not an overall worst-case scenario as determined for Musselburgh. Whilst the chosen coastal scenario is the worst-case scenario, the chosen fluvial and pluvial scenarios were lesser. This was because the worst-case coastal scenario could be protected against by modestly sized defences, whereas much higher defences would be required to protect against the

equivalent scenario on the River Esk and the Pinkie Burn. This does not mean that the worst-case scenario on the coast is considered more likely to occur, but, rather, that more protection can be provided without significantly greater environmental impacts. The Scheme's chosen allowance for climate change comprises a 0.86m rise in sea level, a 28% increase in peak fluvial flow and a 25% increase in peak rainfall intensity. The selection of these different allowances was influenced by feedback received from stakeholders and the public in accordance with the Stage 4 Consultation Plan approved by a meeting of Full Council in October 2022.

4.9 **Estimated Cost**

a) It is recognised that there are concerns about the estimated cost of the Scheme and how this has increased since the project began. The Scheme notified in March 2024 included an estimate of £103,535,000 for the cost of the Scheme's operations.

b) The cost of large infrastructure projects such as the Scheme can change for many reasons. Changes in scope can introduce additional work which increases the cost. Changes in inflation can make the same scope of work more costly to deliver. Changes within the construction market can also make the same scope of work more costly to construct. Programme delays can extend the total duration of the work, and therefore the inflation associated with this additional time can increase the cost. Even during construction, the cost can be affected by changes, such as unforeseen ground conditions which then necessitate alterations to the design.

c) The larger and more complex a project is, the greater the potential for change. Consequently, the Council implemented a robust change management system at the start of the project. This is overseen on multiple levels, initially by the Project Team, who then reports to the Project Board, who in turn reports to the Council's elected members. Changes that would significantly increase cost are appropriately escalated and are decided by the elected members.

d) Reasons for change in the estimated cost of the Scheme include, but are not limited to:

    i. **Change in scope** – Availability of new data led to a greater understanding of the current and projected effects of climate change, and therefore the potential risk from coastal flooding. This resulted in the need for coastal defences which were not previously anticipated or included in earlier cost estimates.

ii. **Change in scope** – Council have been advancing three separate projects in Musselburgh: (i) the Scheme; (ii) the Musselburgh Active Travel Network ((MAT); and (iii) a project to repair the Ash Lagoons Seawall. At key locations, and over many km's of length, these separate projects share one footprint on Musselburgh's landscape. Under authority deriving from Council the Scheme's Project Team developed one holistic design that could achieve the outcomes of all three projects during the Scheme's design development. One effect of this is that the costs previously associated with the Ash Lagoons Seawall are now included within the Scheme's estimate of £103M. In parallel, the £103M estimate does not allow for the costs of delivering the MAT project.

iii. **Change in Programme** – the impact of the COVID pandemic meant that the Scheme's consultation with the public commenced later than originally planned. This had the effect of increasing the total duration of the project and increasing the portion of the estimated cost associated with inflation.

iv. **Change in Programme** – when consultation was able to commence after the pandemic, the Council then significantly increased its scope and duration in response to public demand. This also had the effect of increasing the total duration of the project and increasing the portion of the estimated cost associated with inflation.

e) It is understood that some people have asked for a cap to be imposed on the cost of the project. Considering the potential for change as outlined above, and the change management process which has been implemented, this approach is not considered practicable. Nevertheless, the Council will continue to regularly monitor the Scheme's financial forecasts against affordability.

f) In summary, whilst the estimated cost of the Scheme has changed considerably since its inception, there are clear reasons for this. In each instance, change has been managed through the robust and transparent oversight of the Council's officers and elected members. The Scheme as notified in March 2024 is still considered to represent value for money in the context of the cost of damages avoided through the reduction of Musselburgh's flood risk. In recognising the ongoing potential for change during the delivery of the Scheme, the Council will continue to regularly monitor the Scheme's affordability.

4.10 **Cost-benefit analysis**

a) Some objections related to the Scheme's cost-benefit analysis and its demonstration of value for money.

b) An economic assessment of the Scheme was first conducted by Jacobs in October 2019. This considered the monetary value of flood damages avoided (flood protection benefits) versus the cost of delivering the Scheme. It was based on the Preferred Scheme concept that was subsequently approved by Council's cabinet in January 2020. Whilst the core components of that Preferred Scheme remained part of the Scheme which was notified in March 2024, their specific position, scale, and form evolved in various ways. This was primarily due to significant consultation carried out with statutory consultees, landowners, and the public. Feedback from those consultations influenced the design decisions taken thereafter and thus shaped the Outline Design which was accepted by Full Council in January 2024.

c) Consequently, the economic assessment was updated by Jacobs in April 2024 to reflect the latest available data in terms of flood damages avoided and Scheme cost. The assessment was conducted in accordance with the Scottish Government's *'Flood Protection Appraisals: Guidance for SEPA and Responsible Authorities',* Middlesex University's *'Multi Coloured Manual',* and Middlesex University's *'Multi Coloured Handbook 2023'*. In addition, it followed the overarching public sector guidance set out in the Scottish Government's *'Scottish public finance manual - appraisal and evaluation'*, and HM Treasury's *'Green Book'*.

d) The assessment concluded that over a 100-year appraisal period, the Scheme's new works (i.e. excluding repairs to the Ash Lagoons Seawall) had a Present-Value (PV) cost of £64.2million and a PV benefit of £91.2million, resulting in a benefit-cost ratio (BCR) of 1.42. Taking into account the proposed works to the existing seawall, the PV cost of the Scheme increased to £109.4million, resulting in a benefit-cost ratio of 0.83.

e) It is highlighted that the works on the seawall produced new costs that are clearly definable and thus the cost of the investment goes up from £64.2M to £109.4M, however these works cannot account for any further benefits within this type of economic analysis as the seawall already exists and this benefit has already been accounted for. This is why the BCR goes is lower. This report wishes to record that in parallel to this economic appraisal that there are key benefits that have not here been monetised / quantified to justify the investment in the seawall: the requirement to

contain the ash waste into perpetuity; the avoidance of an environmental incident associated with that ash waste and the ongoing provision of flood risk reduction benefits to Musselburgh. Finally it is recorded that Council did consider alternative options to provide flood risk reduction to the eastern Musselburgh coast on a different alignment to the existing seawall, but that these options would have been more expensive by way of net cost even if they would have been able to account for a benefit and thus deliver a less onerous perspective to the BCR.

f) In summary, the economic assessment demonstrates that the Scheme's new works demonstrate value for money insofar as their flood risk reduction benefit is greater than their cost. Whilst the works required to the Ash Lagoons Seawall would lower the Scheme's benefit-cost ratio, it is recognised that there is an overriding environmental reason for its repair, and that it is also a multiple benefit delivering a number of key objections of Council simultaneously.

4.11 **Height of Flood Defences**

a) The public's desire to minimise the need for physical defences along the River Esk and the Firth of Forth is fully understood. Through the development of a flood model, Jacobs established that to achieve a 0.5% Annual Exceedance Probability (AEP) or 1 in 200-year standard of protection, any combination of solutions, either in the town or in the catchment, would have to include physical defences within the town. The aim, therefore, was to minimise the height of those defences. The required height of physical defences was a function of the desired standard of protection, the effect of bridge blockage, an allowance for the effects of climate change, and an allowance for residual uncertainty.

b) Standard of Protection

i. At the outset of the project, the Council established thirty-three objectives, one of which was to, "aspire to meet a level of protection to protect against a 0.5% AEP (plus an allowance for climate change) flood event". The project was identified in SEPA's Flood Risk Management Strategy for the Forth Estuary Local District Plan, which ranked Musselburgh 11th out of 42 Schemes in terms of priority across Scotland and identified an action to provide a flood protection scheme for Musselburgh with at least a 1 in 200-year standard of protection.

c) Bridge Blockage

i. Several of the bridges across the River Esk in Musselburgh are currently at risk of being blocked or partially blocked by debris during a major storm. In this instance, debris, in the form of tree trunks and large branches, can get washed from the riverbanks and become lodged under bridges downstream. The debris acts much like a dam and causes the water level upstream of the bridge to rise, thereby advancing the onset of flooding. If physical defences are constructed to contain this floodwater, they must be higher to account for the effect of the bridge blockage than if the water was able to pass more easily beneath the bridge.

ii. To mitigate the risk of bridge blockage and thereby reduce the required height of physical defences on the River Esk, the Council has proposed to replace the Ivanhoe Footbridge, Shorthope Street Footbridge, Electric Bridge and Goosegreen Footbridge. The replacement bridges will each have a single span (without any intermediate piers) and a higher deck level, both of which will reduce the risk of blockage. The Roman Bridge and Rennie Bridge cannot feasibly be replaced due to their historic nature. Consequently, the Council has proposed a construction of a debris trap upstream of the A1 to intercept larger woody debris from the catchment before it reaches these two bridges. While this form of debris management will not eliminate the risk of debris reaching the historic bridges, it is a pragmatic approach which is still considered worthwhile in attempting to reduce the risks associated with these two structures.

d) Allowance for Climate Change

i. In response to public feedback, the Council instructed Jacobs to assess a range of climate change scenarios and the effect they would have on the height of physical defences. The assessment considered four scenarios from ‘zero’ climate change through to a probable worst-case high emissions scenario by the year 2100. The impact of these scenarios on defence heights was considered for a selection of locations around Musselburgh and found to have as little as 0.55m and as much as 1.82m of a difference between the best-case and worst-case scenarios.

e) Residual Uncertainty and Freeboard

i. Flood risk management always involves a degree of uncertainty. This is because flooding mechanisms are often far more complex than even

the most sophisticated model can replicate. There is also a practical limit to the quantity and accuracy of data which can be collected. It is therefore appropriate to consider the level of uncertainty within the analysis and include an allowance for the residual uncertainty which has not been explicitly addressed elsewhere in the process. Freeboard is an example of how to allow for residual uncertainty and involves increasing the height of a defence by a defined amount. The Scheme's freeboard varies between 300mm and 600mm depending upon the location of each physical defence and the uncertainties associated with it. This approach was discussed with SEPA and is consistent with their Flood Risk Standing Advice for Planning Authorities (November 2020).

4.12 **Replacement of Bridges**

a) Six bridges cross the River Esk in Musselburgh between the Eskmills weir and the Mouth of the River Esk: Ivanhoe Footbridge, Olive Bank Bridge, Roman Bridge, Rennie Bridge, Shorthope Street Footbridge, Electric Bridge and Goosegreen Footbridge. A flood risk assessment conducted by Jacobs identified that, due to their low soffit levels (the underside of the bridge) and the presence of in-stream piers, many of these bridges would restrict the flow of water during a 0.5% annual exceedance probability (AEP, or 1 in 200 year) flood event. They were also at risk of further restricting flow due to potential blockage from large woody debris commonly found in floodwater.

b) One consequence of this restriction in flow is that floodwater would overtop the riverbanks immediately upstream of each bridge sooner than it otherwise would without that restriction. Another consequence is that some of the bridges could become unsafe to use during or after a flood event. Furthermore, if flood defence walls or embankments were constructed on the riverbanks, they would have to be higher because of the restriction in flow.

c) During the Scheme's options appraisal, it was identified that if bridges were removed or replaced then the restriction in flow attributable to each bridge could be reduced or eliminated. The appraisal concluded that it would not be acceptable to remove or replace the Roman Bridge or the Rennie Bridge due to their historic value. It also concluded that the Olive Bank Bridge posed the least flood risk and did not justify removal or replacement. Furthermore, the appraisal concluded that the level of connectivity within the town should be maintained and therefore it would be unacceptable to remove any bridge without also providing a direct replacement. Subsequently it was determined that the Ivanhoe Footbridge, Shorthope Street Footbridge, Electric Bridge and Goosegreen

Footbridge should all be replaced with new single-span bridges with soffit levels above the design flood level.

d) It is recognised that some people feel that the replacement of these bridges has been driven by the Musselburgh Active Toun (MAT) project. That project is also being developed by the Council and its aim is to provide an enhanced network of shared-use active travel paths around Musselburgh for pedestrians and wheeled users. The MAT project proposes to utilise these same four bridges as part of its network, and to do so would have to replace them with wider decks to comply with the relevant design requirements.

e) When the Scheme began, the Council established numerous objectives, one of which was to seek to deliver multiple benefits. This is consistent with Scottish Government guidance. A multiple benefit is where two projects, each with their own funding, can be delivered in a coordinated manner to achieve added value or at less cost than if the two projects were delivered separately. In the case of the Scheme and the MAT project, both would intend to replace the same four bridges but for different reasons and to different performance requirements. By combining the funding, the first project could replace the bridges once to meet the needs of both projects, rather than them being replaced a second time in near future, and at additional cost, by the later project.

f) In summary, the replacement of four bridges across the River Esk has been proposed to reduce flood risk while maintaining the current level of connectivity. Doing so is a legitimate flood risk management strategy. In designing these replacement bridges, it was also appropriate to consider reasonable and proportionate changes in performance requirements during their design life. In this case that meant providing wider decks, and in the case of two of the four bridges, relocating them to better accommodate possible active travel routes in future. Nevertheless, the four replacement bridges are legitimate parts of the proposed Scheme and, if successful, would be consented as such.

4.13 **Repairs to the Ash Lagoons Seawall**

a) Some objections relate to the inclusion of repairs to the Ash Lagoons Seawall as part of the Scheme, with the suggestion that these repairs should be funded by its current owner, Scottish Power.

b) The seawall was constructed in the 1960s to contain ash waste deposits from Cockenzie Power Station. The power station has since been decommissioned and environmental restoration works have been carried

out to the area inside the seawall to form a series of environmental bird scrapes / ponds and a planted landscape. When the seawall was constructed, a legal agreement, known as the 'Musselburgh Agreement', set out arrangements for the assets in Musselburgh (i.e. the Electric Bridge; the Ash Lagoons Seawall; and ash waste itself which sits under the restored landscape of planting and bird scrapes) following the decommissioning of the power station. On this basis the Council and Scottish Power are currently negotiating with respect to the future ownership of these assets.

c) Whilst the intended purpose of the seawall was to contain ash waste deposits, it also happens to provide a degree of flood protection to Musselburgh from coastal flood risk. The Preferred Scheme approved by Council's Cabinet in January 2020 recognised the importance of this seawall in providing flood protection to Musselburgh. The Scheme, as published in March 2024, relies upon the continued performance of the seawall to prevent flood defences to the west and along the River Esk from being outflanked in the event of a coastal flood event. Since the seawall is now beyond its intended 50-year design life, there is a risk that, unless adequately maintained and repaired, parts of the seawall could fail during the lifetime of the Scheme. This could result in potentially catastrophic adverse effects on the marine environment.

d) The Flood Risk Management (Scotland) Act 2009 enables a local authority to carry out work on land owned by another party or to another party's assets for the purposes of reducing flood risk. Meanwhile, it is understood that the current owner has no obligation to ensure the seawall acts as a flood defence, since this was not its intended purpose, and it is not the responsibility of such a third part to deliver flood risk reduction to Musselburgh. As a result, the inclusion of works to repair the seawall within the Scheme is considered to be a pragmatic means of ensuring its continued performance in respect of reducing flood risk, while not being contingent upon the Council owning the structure.

e) In summary, the seawall contributes to reducing Musselburgh's coastal flood risk, but requires maintenance to ensure its continued operation for this purpose. It is therefore considered legitimate for these repairs to form part of the Scheme.

4.14 **Consideration of Nature-based Solutions**

a) Catchment

i. It is understood that the public would like nature-based solutions, or Natural Flood Management (NFM), to be used to reduce Musselburgh's flood risk, and that there is a desire for these to be used preferentially before resorting to engineering-based solutions.

ii. In determining the best combination of solutions to protect Musselburgh, a comprehensive options appraisal was conducted in 2019. Ninety-six potential options, including nature-based solutions, were appraised in terms of their economic, technical, environmental, social, and health & safety considerations. Some of the key considerations for nature-based solutions related to performance and cost, and included:

- "Has this option been successfully tried and tested elsewhere on a comparable scale before?";
- "What operational and maintenance burden would this option impose on the Council during the design life of the Scheme?";
- "Would this option be capable of protecting Musselburgh from a 1 in 200-year flood, or making a meaningful contribution to that standard of protection as part of a combination of multiple options?"; and
- Would the cost of this option deliver value for money in terms of how much it reduces Musselburgh's flood risk?

iii. In conjunction with the options appraisal, Jacobs conducted an NFM Opportunities Study in 2019. Whilst it identified potential target areas for further consideration of NFM measures on the River North Esk catchment, the report concluded that these interventions would likely have insufficient impact on peak flow to deliver demonstrable flood risk reduction benefits in Musselburgh. The option appraisal process therefore concluded that, due to the relative infancy of nature-based solutions as a form of flood risk management, and the limited confidence in their performance and reliability, these options were discounted. Instead, modification of existing reservoirs in the catchment was considered a more reliable, effective, and sustainable option for reducing flood risk and this was subsequently part of the preferred Scheme accepted by the Council's Cabinet in January 2020.

iv. Nevertheless, in 2022 the Council instructed Jacobs to consider further opportunities for the use of nature-based solutions. They subsequently engaged with the Scottish Government's national NFM research project on the Eddleston Water. The results of that research, which are publicly available online, indicated that nature-based solutions could potentially reduce peak river flow during a storm by in the order of 5%. Achieving this outcome on the Eddleston Water required many interventions, involving agreements with many different landowners and tenant farmers across the catchment.

v. The Council therefore had to decide whether a 5% reduction in the peak flow of the River Esk in Musselburgh would be a worthwhile option when compared to engineered alternatives. It is considered that nature-based solutions by themselves would not represent value for money relative to the other options available for reducing Musselburgh's flood risk and would do very little to reduce Musselburgh's flood risk. Based on the latest scientific knowledge there is no evidence that nature-based solutions would be capable of providing a greater reduction in Musselburgh's flood risk.

vi. Another concern about nature-based solutions was their deliverability. The Eddleston research project highlighted that delivering a variety of nature-based solutions dispersed across a catchment involved working with a significant number of landowners and tenant farmers. In that instance, their cooperation was entirely voluntary. This often resulted in sub-optimal locations being used because the optimal locations were prime agricultural land and therefore unacceptable to the landowner. This voluntary approach with landowners is not considered compatible with the FRM, which would make it a criminal offence for a landowner to alter a flood risk reduction measure once in place. On this basis it was felt that landowners would be much less willing to support the Scheme.

vii. Furthermore, the reliability of nature-based solutions remained in question. In the case of tree-planting, they must mature to reach their full potential in respect of reducing surface water run-off. Their effectiveness then varies seasonally depending on when they are in leaf. Over the lifetime of the Scheme a degree of tree-loss could be expected due to storm damage, disease, or changes in land use, meaning that ongoing planting and replacement by the Council would be required to maintain the Scheme's standard of protection. In the case of peatland, its effectiveness is reduced when saturated by prolonged wet weather or frozen by cold weather. In the case of meanders and leaky barriers, what works in one location may turn out

to be entirely ineffective elsewhere. Finally, the presence of two sub-catchments above the River Esk presented the risk of catchment synchronisation. Since hydrological analysis indicates that the River North Esk peaks before the River South Esk, attenuating flow on North Esk could cause its peak flow to coincide with that of the South Esk, which would increase flood risk in Musselburgh. To meet the Council's operational needs, the Scheme needs to operate in a reliable and predictable manner 365 days a year, in all weather conditions from day 1 until the end of its design life. Nature-based solutions are not currently able to provide this degree of certainty.

viii. Notwithstanding the limitations explained above, it was considered that nature-based solutions could be a viable response to the effects of climate change. Since the speed and extent of climate change is uncertain, nature-based solutions, rather than protecting against the present-day risk would not have to immediately deliver flood risk reduction benefits. Solutions such as tree-planting would have the opportunity to mature. Combined with a network of monitoring, the Council would have the opportunity to assess the effectiveness of individual measures over a period of years and decades and adapt the measures accordingly.

ix. In summary, whilst the public's desire for nature-based solutions to be used in preference to engineering-based solutions to reduce Musselburgh's flood risk is recognised, current scientific evidence does not support this approach in respect of the present-day risk. Nevertheless, they could contribute to offsetting the effects of climate change in the longer term. For this reason, in October 2023 the Council committed to further investigation of nature-based solutions in the catchment as part of a long-term managed adaptive approach under the Local Flood Risk Management Plan. This will progress at its own pace, independently of the Scheme, but will complement the Scheme's measures to help maintain the standard of protection over time.

b) Coastal

i. As well as catchment based NFM, it is also understood that the public would like the use of equivalent measures reduce coastal flood risk. Musselburgh's coastal flood risk differs from its fluvial risk insofar as the cause of coastal risk is expected to change over time. This change affects which measures would be effective throughout the whole life of the Scheme.

ii. The coastal flood risk from a present day 0.5% Annual Exceedance Probability (AEP), or 1 in 200-year, event is predominantly from wave overtopping. This means that for such an event, the current shoreline would be higher than the theoretical still sea level, but breaking waves would be liable to cause flooding to properties. However, the projected climate change induced sea level rise would mean that by 2100, a 0.5% AEP coastal flood event would be higher than the current shoreline. This means that, rather than wave overtopping, the sea would inundate properties.

iii. Some coastal NFM measures, such as offshore breakwaters and artificial reefs, would potentially reduce wave energy. In doing so they could contribute to reducing the present-day flood risk from wave overtopping. Those measures, however, would be ineffective against coastal inundation as a result of climate change induced sea level rise. The only measures which would be effective in that scenario would be a physical barrier on shore or a tidal barrier in the Firth of Forth. The latter was discounted on the basis of its very high capital cost and also due to the environmental impact such an option would have on the Firth of Forth Special protection Area.

iv. It was determined that a physical barrier on shore would be the best method of addressing the current risk from wave overtopping plus the future risk from sea level rise. Such a barrier could take the form of a wall, an embankment or sand dunes.

v. The Council instructed Jacobs to assess the feasibility of using sand dunes between the River Esk and Fisherrow Harbour. They concluded that while sands dunes would be feasible, there were also significant constraints. Since the dunes would likely move and erode over time, the Council would have to be prepared to periodically replenish and redistribute the sand. This ongoing maintenance would not be part-funded by the Scottish Government's flood protection scheme programme. The shape of sand dunes and their potential to move also meant that they would have to be several metres higher than an equivalent wall. This would have a greater visual impact. They would also have a much larger footprint, thereby occupying much of the existing beach. Due to existing infrastructure such as the Promenade, a regional sewer, and properties, it would not be possible to set back the new dunes further. All of these constraints led the dunes to be discounted as a viable option.

vi. In summary, in the course of developing the Scheme the Council did consider a variety of coastal NFM options. Due to the changing nature

of Musselburgh's coastal flood risk, none of these measures would be adequate for the whole life of the Scheme without introducing significant additional cost and maintenance burden. Notwithstanding the above, it is recognised that some of these measures, whilst unsuitable by themselves, could be implemented as adaptive measures in the future in addition to the physical defences proposed by the Scheme. These adaptive measures could be designed to address future coastal erosion caused by climate changed induced sea level rise. These could be developed as part of the Council's forthcoming Coastal Change Adaptation Plan.

4.15 **Consideration of Dredging**

a) It is understood that some people feel dredging the River Esk would reduce flood risk in Musselburgh. Dredging was historically carried out on a semi-regular basis on the River Esk by various industries in Musselburgh. They did this for several reasons including to obtain a free source of river gravel for building foundations and roads, rather than specifically to reduce flood risk. Whilst dredging is still used in some circumstances in the UK as a means of reducing flood risk, greater understanding of the science and the impact on the environment now means there are several significant limitations to the use of this technique.

b) Removing material from the riverbed creates an imbalance in the natural river processes of erosion and deposition. Lowering the riverbed level increases its gradient and the velocity of the water. Over time the natural processes will tend to fill in the void where material was removed. This is often achieved by erosion of the riverbed and riverbanks upstream to provide a supply of replacement material. This erosion can destabilise the channel upstream, leading to undesired effects.

c) Due to the natural processes described above, dredging must be repeated periodically if its benefits are to be maintained. This creates an ongoing maintenance burden for the responsible authority, which in this case would be the Council. Dredging is a costly activity and, when compared to the design life of an alternative solution such as physical defences, it is generally considered to be more expensive and less value for money.

d) Dredging also has significant environmental implications: it negatively impacts on fish habitat and breeding grounds; it negatively impacts riparian vegetation; and the dredged material may contain contamination from past industry, which must be disposed of appropriately. For these reasons, dredging requires an environmental licence issued by SEPA. It is generally understood that due to the need to repeatedly dredge the river

on an ongoing basis, such a licence would not be achievable in this instance.

e) In addition to the economic and environmental limitations, dredging also has significant technical limitations in the case of Musselburgh. Since the riverbed is much narrower than the width of the riverbanks, reducing the riverbed level by, for example, 1m would not provide the same standard of protection as providing 1m high flood defences on top of the riverbanks.

f) Furthermore, dredging the lower stretch of the River Esk which is tidal would have no effect on reducing flood risk. This is because the flood risk at this location is determined by coastal flooding rather than the flow in the river itself. In the event that the river here was dredged, the sea would simply fill the void, and there would be no additional capacity.

g) In summary, it is considered that dredging the River Esk would be costly, unsustainable, and largely ineffective in reducing Musselburgh's flood risk.

4.16 **Consideration of Demountable & Self-Rising Barriers**

a) It is understood that some people would have preferred the Scheme to include more demountable barriers instead of fixed walls and embankments. Demountable barriers were considered during the options appraisal process but were largely discounted for operational reasons. The additional impact that the construction of self-rising barriers would have on the existing Musselburgh landscape, including its streetscape and especially its trees, was also a major factor in ruling out this option.

b) The main advantage of demountable barriers is that when they are not in use, they have no visual impact on the surrounding landscape. For this reason, they are often favoured by the public. When not in use, the barriers are either dismantled and stored off-site, or they are stored in hidden chambers below the ground.

c) The main disadvantage of demountable barriers is that they impose an operational and maintenance burden on the asset owner. Manual demountable barriers require substantial space for storage, substantial numbers of trained personnel to deploy them and substantial time to do so. This requires advance warning of the approaching flood event. Even self-rising barriers require personnel on site to ensure they deploy correctly and to act if they do not. Demountable barriers have a range of moving parts and watertight seals which must be regularly inspected, tested, maintained, and periodically replaced. When compared to a static flood

defence with no moving parts, all forms of demountable barrier have an inherently greater risk of failure to operate.

d) Self-rising barriers are one type of demountable barrier and given their stored parts and functional / operational parts are an integral part of the unit they normally occupy a large space under the ground. This often comprises of a large tank that fills with water as the river levels rise and which floats the flood wall into place as the flood risk increases (water levels rise). These larger underground structures require a comparably larger excavation footprint during construction. The result of this is that more land within the existing landscape is required to be excavated and thus more utilities need to be moved, more trees need to be removed, more roads and footpaths need to be closed and occupied for the works duration. In the longer term the presence of more physical infrastructure below the ground neutralises more landscape from being available for replanting trees.

e) For the reasons stated above, demountable barriers are often chosen as a last resort, where fixed defences would not be practicable. An example of this would be in the case of an access to a car park or a building. For Musselburgh, the Council does not have sufficient operational capacity to maintain or deploy long lengths of demountable barriers. Whilst a short length of demountable barrier has been proposed at Millhill car park to maintain emergency access to the river, the burden and risks associated with using this form of defence more widely were unacceptable to the Council. For this reason, they were rejected during the options appraisal.

4.17 **Consideration of Property-Level Protection**

a) It is understood that some people would have preferred the Scheme to include more Property-Level Protection (PLP) instead of flood walls and embankments. PLP can include watertight doors and windows, demountable barriers on access points, non-return valves on domestic drainage systems, and watertight airbricks for solum ventilation.

b) One advantage of PLP is that it has no impact on the wider environment and no significant disruption associated with its installation. For this reason, it is often favoured by the public. Another advantage is that it is a lower-cost measure when applied to a small number of properties.

c) The main disadvantage of PLP is that it only protects the property itself but not the surrounding infrastructure. Cars would still be damaged. Public utilities such as sewers, water, electricity, and telecommunications would be affected. Properties would still be inaccessible during a flood, and

emergency access would be limited. PLP is also only suitable for flood depths up to in the order of 0.6m to 0.9m and is dependent on the form of construction of the property. In some locations the flood depths would be far in excess of this level.

d) As a result of the disadvantages stated above, combined with the low cost of the individual products, PLP is usually only used a last resort where there is an insufficient business case for more expensive alternatives. An example of this would be a very small community comprising a few homes with limited surrounding infrastructure. In this instance, the modest cost of flood damages avoided would not justify a more expensive form of intervention.

e) The large-scale use of PLP in Musselburgh would be an inappropriate risk management strategy. Several thousand properties are at risk of flooding, and the scale of flood damages that would be avoided merits a greater level of intervention to protect not only the properties at risk but also the surrounding infrastructure. The Council considered PLP during the Scheme's options appraisal but subsequently rejected it for the reasons stated above.

4.18 **Consideration of Other Reservoirs / Creating New Reservoirs**

a) The Scheme includes modifications to Rosebery and Edgelaw reservoirs to increase their storage capacity during a storm event. This would have the effect of reducing the peak flow in the River Esk downstream, thereby reducing the required height of flood defences within Musselburgh. Some have questioned whether additional reservoirs in the catchment could be modified, or new flood storage areas constructed, to further reduce peak flow and the extent of flood defences required in the town.

b) The potential to attenuate floodwater in the catchment was considered during the Scheme's option appraisal process. A high-level hydraulic analysis of the River Esk's tributaries indicated that flow in the River South Esk peaks slightly later than the River North Esk and with a greater proportion of the total flow.

c) Consequently, reducing and delaying the peak flow on the South Esk would have the greatest effect on reducing flood risk to Musselburgh. The identification of suitable sites for a new storage area was limited due to the incised nature of the catchment. Attention focused on the area surrounding the existing Gladhouse Reservoir due to confidence in the underlying geology being capable of supporting a large, raised reservoir. A new flood storage reservoir near Howburn Farm was subsequently

proposed, which would have a 20m high, 300m long dam containing 2,200,000 cubic metres of water. This new flood storage area was later discounted due to the high capital cost and likely environmental impact involved.

d) The option appraisal also considered the use of existing Scottish Water Reservoirs on both the North and South Esk catchments – the candidate reservoirs were Gladhouse, Rosebery, Edgelaw and Portmore on the South Esk, and Glencorse and Loganlea on the North Esk. Discussions with Scottish Water's Reservoirs team established that the only reservoirs which Scottish Water would consider acceptable to be adapted for flood storage were Edgelaw on the Fullarton Water (a South Esk tributary) and Rosebery on the River South Esk.

e) In summary, further attenuation in the catchment using new flood storage areas or the modification of existing reservoirs was considered by the Council, but ultimately discounted on the basis of capital cost, environmental impact, and the acceptability to Scottish Water.

4.19 **Impact on Amenity, Health, and Well-being**

a) It is understood that the construction of the Scheme would have a temporary impact on amenity, health, and well-being. It is estimated that the construction phase would take between three and four years to complete. This impact was identified during the scoping stage of the Scheme's Environmental Impact Assessment (EIA) and subsequently assessed. The results of that assessment are included within the EIA Report (Chapter 6 - Population and Human Health; Chapter 8 - Noise and Vibration; Chapter 12 - Air Quality and Climate Change; and Chapter 14 - Traffic and Transportation).

b) Where potentially significant effects were identified, appropriate mitigation measures were proposed to eliminate those effects or reduce their magnitude. The proposed mitigation measures include:

i. Limitations on working hours during the week, and avoidance of weekend working;

ii. Use of a construction phase health and safety plan, with requirements such as the use of appropriate site boundaries and control measures for safe vehicle movements;

iii. Appointment of a construction phase community liaison officer to engage with the community and local schools;

iv. Use of a phased construction programme so that not all parts of the site will be occupied by the contractor at any one time. Doing so will enable the community to use alternative amenity spaces around the town which any one part of the Scheme is under construction;

v. Use of noise and vibration limits through an appropriate monitoring plan, plus restrictions on the use of certain construction methods and equipment;

vi. Use of a dust management plan, with requirements to limit the spread of dust beyond the construction site; and

vii. Use of an adaptive construction traffic management plan incorporating various traffic management measures and temporary diversion routes.

c) It is considered that, whilst some adverse residual effects are predicted during the construction of the Scheme in relation to loss of access to recreational and green space as well as from construction related disruption, the magnitude of the effects would be reduced by properly implemented, effective mitigation measures. Most importantly, positive effects are predicted in terms of reduced flood risk and associated mental health benefits.

4.20 **Impact on Tourism**

a) When constructing a major infrastructure project, such as the Scheme, within an urban environment such as Musselburgh, some degree of temporary disruption is inevitable. Understandably, some people have expressed concern that this disruption over an extended period would have a negative impact on tourism which in turn would have a negative impact on local businesses. This potential impact was identified during the scoping stage of the Scheme's EIA and subsequently assessed. The results of that assessment are included within the EIA Report (Chapter 6 - Population and Human Health).

b) Construction works in the Musselburgh beach and Fisherrow Harbour area might affect the amenity of holiday let accommodation both in terms of noise and visual impacts along the seafront. However, these impacts would likely affect individual sections for up to one season, and visitors using these properties would generally use the properties as a base and travel elsewhere during the day, meaning it would be unlikely to significantly impact the use of the accommodation.

c) Whilst impacts to the amenity of some parts of Musselburgh would occur temporarily, it is not expected that the scale and duration of the amenity

impacts at each location would have a discernible impact on the overall tourism economy.

4.21 **Impact on Sites Designated for Nature Conservation**

a) Some objections to the Scheme include concerns about potential impacts that the Scheme would have on the qualifying features (birds) of sites designated for nature conservation, particularly those originally designated under international legislation, including the Firth of Forth Special Protection Area (SPA) and Ramsar, and the Outer Firth of Forth and St Andrews Bay Complex SPA. There are many species of seabirds and waders that use the Firth of Forth for feeding and roosting, with species such as bar-tailed godwit, knot and oystercatcher being recorded in significant numbers at low tide.

b) Impacts on these sites are regulated under The Conservation (Natural Habitats, &c.) Regulations 1994 (commonly referred to as the Habitat Regulations). Under this legislation, the Council is currently undertaking an 'Appropriate Assessment' (AA) to determine whether the construction and / or operation of the Scheme would potentially cause 'Adverse Effects on Site Integrity' (AESI). It should be noted that the HRA process is separate to the Scheme's Environmental Impact Assessment (EIA), although the approach to both should be coordinated. Consequently, whilst the EIA had to be concluded prior to the Scheme's notification under the FRM, the HRA did not. It is understood, however, that the HRA must be complete before the Scheme is confirmed under the FRM.

c) The Council has been consulting closely with NatureScot throughout the ongoing HRA process. The scope of the Appropriate Assessment has increased due to the inclusion of works to the Ash Lagoons Seawall within the Scheme. Further bird surveys are therefore being completed to determine which birds might be disturbed by works and to what extent, what mitigation could be adopted to reduce the disturbance (e.g. limiting the extent of works at any one time) and whether such mitigation would ensure no AESI.

d) The proposed works to the seawall are necessary to extend its design life (the structure is already beyond its intended design life) and ensure the coal ash deposits within it are contained. They are also necessary to ensure that the structure continues to function as a coastal flood defence, albeit this was not its intended purpose when first constructed. If the seawall was not maintained and it subsequently failed, it would likely cause long-term AESI as feeding grounds became contaminated and the lagoons / restored landscape or bird scrapes etc. collapsed.

e) If the AA determines that, in spite of any applied mitigation, AESI cannot be avoided, the Council will progress to the next stage of the HRA process, namely consideration of alternatives. If it is then concluded that there are no alternatives which achieve the Scheme's objectives, the Scheme would most likely be considered necessary for 'Imperative Reasons of Overriding Public Interest' (IROPI), and any measures required to compensate for the residual and unavoidable AESI would then be considered and delivered.

4.22 **Impact on Biodiversity**

a) A number of objections to the Scheme concern its potential impacts on biodiversity resources such as species and habitats. Impacts on biodiversity resources were assessed in the EIA Report (Chapter 7 – Biodiversity).

b) Prior to undertaking the EIA itself, the proposed approach to identifying potential impacts on species and habitats was set out in a Scoping Report. This is how environmental regulators were consulted on the aspects that the EIA would focus. NatureScot responded in their Scoping Opinion with detailed recommendations for any changes to the proposed approach. Thereafter, during the main assessment, consultation was maintained with them to discuss progress, data requirements, impacts as assessed, proposed mitigation and monitoring. As such, the impact of the Scheme's construction and operation was considered for all species and habitats that could be affected.

c) The report identified all the species and habitats that could potentially be significantly affected by the Scheme's construction and operation. For example, adverse effects were predicted on species such as Kingfisher, Otter, and Bats, as well as habitats including the river environment and woodland.

d) The report identified specific mitigation measures to address such impacts, as well as the residual effects, i.e. once the mitigation measures have been successfully applied. Example mitigation measures included: avoiding working during the hours of darkness wherever possible; and implementing a construction lighting plan, which would take into account the need to avoid illuminating sensitive bird or bat habitats where known protected species activity had been identified through pre-construction ecological surveys.

e) Assuming all the mitigation measures were successfully applied, most of the adverse effects on biodiversity resources would be reduced to "not

significant", except for impacts associated with woodland loss. However, it is noted that the significant adverse effect of woodland loss would mostly be temporary in nature, with a mix of tree types and ages being planted to replace those lost. Trees would be planted at a 3:1 ratio for normal woodland and a 5:1 replacement for ancient woodland, which would ensure that, as new woodland becomes established, the Scheme would have a positive effect. However, given the nature of 'ancient' woodland, which is considered an important and irreplaceable national resource, long term adverse effects of significance cannot be completely avoided as it cannot be replaced 'like for like'.

f) A Landscape and Habitat Management Plan would be prepared during the Detailed Design Stage to specify all the landscaping and habitat measures to be delivered as part of the Scheme, and a Monitoring Plan would be implemented during the construction phase to determine the effectiveness of the mitigation and compensation measures. It is considered that once replacement planting becomes established, the Scheme will have a long-term positive effect on biodiversity.

4.23 **Impact on Trees**

a) It is understood that trees are an important asset that can provide a variety of benefits in terms of biodiversity, air quality and public amenity within an urban landscape, alongside a role in climate change impact mitigation and flood risk reduction. The Council and Jacobs share the public's desire to minimise the Scheme's impact on trees. This is one of many competing impacts that have had to be weighed against the benefits of reducing Musselburgh's flood risk.

b) The Scheme's options appraisal considered many options for reducing flood risk in Musselburgh. These were appraised in terms of economic, technical, environmental, social, and health & safety factors. The analysis determined that to achieve the desired standard of protection, any combination of solutions, either in the town or in the catchment, would have to include physical defences within the town. The need for physical defences on the banks of the River Esk inevitably introduced an impact to trees.

c) To minimise the height of defences, it would be necessary to maximise the width of the river channel by locating defences at the top of the riverbanks, as far back from the water's edge as possible but without encroaching into the adjacent roads. Along most of the riverbank between the Olive Bank Road Bridge and the Electric Bridge, this is precisely the same location where many trees have been planted. Public engagement during the

options appraisal stage suggested that height of defences was the greatest concern. This stage of the project therefore concluded with a preferred scheme report which recommended the removal of trees to facilitate the option of minimising height of defences while still achieving the desired standard of protection.

d) During the outline design, further public engagement suggested that extensive tree removal was also considered unacceptable. In response, changes were made to the design to reduce the number of trees affected. In most cases this meant moving the position of flood defences back towards the river to avoid trees, albeit resulting in an increase in the height of defences. Elsewhere, in one case it was decided to move the flood defence even further back, which would place it in the road and require the street to be reduced in width and made one-way. Despite these changes there were some instances where it was not possible to alter the position of the defences and as a result some impact on trees was considered unavoidable. This is not unusual when delivering a flood protection scheme of this scale in an urban environment.

e) The Scheme's environmental impact assessment recommended that where trees do have to be removed, these should be replaced. The location, number and size of replacement trees would depend upon the individual circumstances. Where possible, replacements would be located close to where a tree was removed, while others might need to be planted elsewhere where space is available. Most trees would be replaced at a 1:3 ratio. Impact on ancient woodland would be avoided wherever possible, but where it is unavoidable these would be replaced at a 1:5 ratio. The size of replacement trees would vary, but where practicable, and where the impact of tree loss is greatest, large 'heavy standard' size replacements would be used.

f) In summary, a wide variety of options were considered in the development of the Scheme, each of which had competing advantages and disadvantages. Whilst the Scheme which was notified in March 2024 does have an impact on trees, the replanting of trees will go some way to mitigating this over time. It is considered that, on balance, the impact is proportionate to the benefit of reduced flood risk.

4.24 **Impact of Noise, Vibration and Dust During Construction**

a) It is understood that construction work can generate noise, vibration, and dust. Some objections relate to the impact this would have on the community during the Scheme's construction. This potential impact was identified during the scoping stage of the Scheme's EIA and subsequently

assessed. The results of that assessment are included within the EIA Report (Chapter 8 - Noise and Vibration, and Chapter 12 - Air Quality).

b) Where potentially significant effects were identified, appropriate mitigation measures were proposed to eliminate those effects or reduce their magnitude. The proposed mitigation measures include:

i. Use of 'soft start' piling techniques to reduce the vibration impacts generated by start-up and ramp down of piling equipment;

ii. Pre-augering or pre-excavation of the pile route to reduce vibration;

iii. Implementation of appropriate noise and vibration limits for all plant and equipment, especially pumps and generators which are known to be a common source of noise disturbance;

iv. Restriction of working hours to between 8:00 and 18:00 Monday to Friday;

v. Keeping local residents informed about the nature and timing of works which are likely to generate noise and vibration; and

vi. Implementation of a dust management plan in accordance with industry best practice.

c) Based on the conclusions of the EIA Report, it is considered that with effective mitigation measures in place and properly implemented, no significant residual effects are predicted with respect to noise, vibration and dust during the construction of the Scheme.

4.25 **Visual Impact**

a) Any physical change to Musselburgh's landscape because of the Scheme would inevitably result in either a positive or negative visual impact. It was therefore important to consider the nature and magnitude of that impact and weigh it against the benefits that the Scheme would provide in terms of reduced flood risk.

b) The visual impact of the Scheme was assessed in a Landscape and Visual Impact Assessment within Chapter 9 of the EIA. To support this, 'before and after' visualisations were produced for key locations that were selected by the Council's Planning Service. The Planning Service was a consultative body for the purposes of the Scheme approval process, and they had the opportunity to object if they considered the visual impact to be unacceptable.

c) Where practicable, mitigation measures were incorporated in the outline design to eliminate or reduce the Scheme's visual impact. For example, stone cladding was included for flood defences within conservation areas. Elsewhere, the alignment of the defences was altered to reduce the need for removal of trees and vegetation. The intent of these mitigation measures was to ensure that where change was necessary it was appropriate to the setting of the surrounding area.

d) It is understood that some objectors felt the EIA visualisations did not provide a true representation of the visual impact and that visualisations should have been provided for each house with a view of the Scheme. The visualisations were produced in accordance with industry guidance and best practice. Furthermore, the purpose of the visualisations was to consider the visual impact at key visual receptors within public amenity areas. It would have been impractical to produce visualisations from the perspective of every house affected. It is therefore considered that the assessment of visual impact within the EIA was appropriate and proportionate for its intended purpose.

e) In conclusion, the Scheme would inevitably change the appearance of Musselburgh's riverside and coastline. Change is necessary to reduce flood risk, and in doing so this would alter people's views. Rather than seeking to avoid change, the aim has been to ensure that any changes would be proportionate and appropriate to their setting. It is considered that the visual impact of the Scheme would be proportionate to its scale and complexity and that, on balance, it would be acceptable in terms of the benefits resulting from reduced flood risk.

4.26 **Impact on Climate Change**

a) It is recognised that many construction materials and methods have the potential to contribute to climate change. Some people have raised concern that the use of concrete within the Scheme, and greenhouse gas emissions associated with its construction, will contribute to climate change. As such, some people believe it would therefore be inconsistent with Council policy and its declaration of a climate crisis.

b) Responding to climate change can take two forms: 'climate mitigation' and 'climate adaptation'. Mitigation involves taking steps to reduce the contribution to climate change. Examples of this include reducing greenhouse gas emissions and reducing the reliance on processes which release carbon. Meanwhile, adaptation involves taking measures to adapt society to live with the effects of climate change. Examples of this include

protecting property and infrastructure from flooding and adapting buildings in anticipation of hotter weather.

c) In many instances climate adaption measures have the potential to contribute to the climate change they are intended to respond to. An example is a flood protection scheme which protects property from flooding induced by climate change, but in doing so uses carbon intensive materials such as concrete. It is therefore necessary to seek to find a balance between responding to climate change and contributing to it.

d) On the other hand, flood protection schemes can also contribute to a reduction in carbon emissions over their design life. Where flooding is avoided, the carbon emissions associated with drying out properties and replacing damaged good is also avoided.

e) There are opportunities to minimise the Scheme's impact on climate change. These include:

   i. Efficient design to minimise the quantity of materials such as concrete, steel, stone, and soil required to deliver the desired standard of protection;

   ii. Use of local materials to minimise greenhouse gas emissions associated with transportation;

   iii. Use of lower carbon materials such as concrete with cement replacement products, and low carbon steel;

   iv. Use of recycled and / or reclaimed materials such as the reuse of stonework where demolition of redundant structures is necessary;

   v. Carbon offsetting through the planting of trees to offset the residual embodied carbon footprint after other mitigation measures have been exhausted; and

   vi. Implementation of a Carbon Management Plan in accordance with the PAS2080 industry standard or similar.

f) On balance, it is considered that the proposed Scheme is a proportionate response to Musselburgh's flood risk now and throughout the Scheme's design life. While it would have the potential to contribute to climate change it would also deliver necessary climate adaptation functionality.

4.27 **Impact on Cultural Heritage**

a) It is understood that the Scheme has the potential to impact on Musselburgh's cultural heritage, namely the character and setting of conservation areas. This potential was identified during the scoping stage of the Scheme's EIA and subsequently assessed. The results of that assessment are included within the EIA Report (Chapter 13 - Cultural Heritage).

b) Where potentially significant effects were identified, appropriate mitigation measures were proposed to eliminate those effects or reduce their magnitude. The proposed mitigation measures include:

i. Use of noise and dust suppression and low vibration techniques to minimise damage to historic structures, with assessment of buildings carried out prior to construction;

ii. Obtaining listed building consents, scheduled monument consents and conservation area consents as appropriate, which will include mitigation measures agreed in consultation with Historic Environment Scotland and the Planning Authority. Such measures might include a programme of archaeological investigation and monitoring historic structures during construction; and

iii. Use of appropriate construction materials and landscaping which are suitable for the setting of heritage assets.

c) Based on the conclusions of the EIA Report, it is considered that with effective mitigation measures in place and properly implemented, no significant residual effects are predicted with respect to cultural heritage either during construction or after completion of the Scheme. For effects on setting, this may require a few years until any planting becomes established and the Scheme becomes embedded in the landscape. Significant positive effects are anticipated for conservation areas, historic buildings, and designated landscapes due to reduced flood risk.

4.28 **Impact on Scheduled Monuments**

a) It is understood that there is concern about the impact that the Scheme would have on the scheduled monument known as "SM6020 Eastfield, enclosures and pit alignments, Old Craighall".

b) In order to construct and maintain the proposed debris trap near Whitecraigs, it was determined that it would be necessary to form an access across a field within Dalkeith Country Park. The field lies within

the designated scheduled monument and is understood to be used by the tenant farmer for grass livery for horses. An existing farm track already extends over approximately 70% of the route required for the Scheme's access.

c) The Scheme proposes to widen the existing access track and extend it to the far side of the field nearest the River Esk, thus providing the shortest direct route from the nearest farm road to the debris trap. In recognition of the potential for buried archaeology, the proposed access track would be formed with unbound material using 'no-dig' techniques, laid onto geosynthetic material to distribute loading evenly over the underlying geology in order to avoid settlement.

d) Alternative locations for the debris trap were considered but were discounted either due to the likely ineffectiveness of the trap at the alternative location, or the inability to safely access the alternative location for construction and maintenance. Alternative means of accessing the preferred location near Whitecraigs were also considered but were discounted due to the significant impact these would have on scheduled ancient woodland or the inability to form a safe access over steep riverbank.

e) In summary, it is considered that the proposed location of the debris trap at Whitecraigs and its proposed access represent the best solution for reducing flood risk. Furthermore it is considered that with appropriate construction methods selected and effective mitigation measures properly implemented, potential residual adverse effects on the scheduled monument would not be significant. This process would be regulated through Scheduled Monument Consent granted by Historic Environment Scotland.

4.29 **Impact on Traffic and Transportation**

a) It is recognised that the construction of the Scheme may result in some temporary and permanent impacts on traffic. Some people have expressed concern that:

i. The construction works might lead to an increase in traffic in the town, resulting in increased congestion, noise, and dust;

ii. Residential roads might be used by construction vehicles to access the site;

iii. Construction traffic within Dalkeith Country Park might impact on horse riders; and

iv. Permanently restricting Eskside West to one-way traffic between Market Street and Bridge Street might result in disruption to the surrounding road network.

b) The potential impact on traffic was identified during the scoping stage of the Scheme's EIA and subsequently assessed. The results of that assessment are included within the EIA Report (Chapter 14 - Traffic and Transportation). Where appropriate, mitigation measures were proposed to eliminate impacts or reduce their magnitude. The proposed mitigation measures include:

i. Regulated working hours to, where practicable, avoid heavy volumes of construction traffic during peak periods;

ii. Consideration of other construction activity in the local area, with a collaborative approach to minimise the effects of any programme conflicts;

iii. Installation of additional warning and speed control signs where appropriate;

iv. Use of wheel wash facilities and road sweepers to minimise transfer of mud and debris onto the road network surrounding the site;

v. Establishment of a construction liaison committee, comprising the Council, the contractor(s), the police and the public, to effectively communicate upcoming construction activities and their likely implications;

vi. Use of temporary parking restrictions and identification of suitable alternative parking; and

vii. Temporary diversion of public footways and public rights of way plus reinstatement upon completion of the works.

c) With regard to the use of residential streets for access, it is anticipated that, wherever practicable, main roads would be used for construction access. Notwithstanding this, it is recognised that vehicles that are appropriately taxed and insured can use any road which forms part of the adopted road network unless there is a height, width, or weight restriction in place. Construction vehicles must also comply with the Road Vehicles (Construction and Use) Regulations 1986 (C&U), as amended, and the Road Vehicles Lighting Regulations 1989, as amended.

d) With regard to the impact of construction traffic within Dalkeith Country Park, it is anticipated that the volume of construction traffic at this location would be relatively low, and the construction period could be in the order of six to eight months. Once in operation, it is anticipated that vehicle access to the location would only be required intermittently, following substantial storm events.

e) With regard to traffic alterations on Eskside West, the detailed design will be developed in partnership with the Council's Roads officers to ensure compliance with appropriate traffic and road safety requirements.

f) In summary, any construction phase traffic impacts would be temporary and managed through appropriate mitigation measures. Permanent impacts would be limited, and it is considered that these could be managed appropriately though the detailed design. It is considered that, on balance, the impact to traffic is proportionate to the benefit of reduced flood risk.

4.30 **Impact on Common Good Land**

a) This report would like to highlight that Council understand that the Proposed Scheme will impact Common Good Land, however it is considered that this will overall be a net beneficial impact. The Scheme will remove Common Good Land from being at risk of flood events in Musselburgh. The design of the Scheme has been developed through a process of consultation and in partnership with other projects to develop one overall holistic design (as per the logic of delivering multiple benefits which is detailed elsewhere in this report). An EIA Report has been developed to consider the environmental impact of the Scheme and this is reported on elsewhere in this report. It is considered that once the Scheme is delivered that the Common Good Land will remain available for the use and enjoyment of the people of Musselburgh into the future and that any change to that landscape and environment will either be net neutral or enhanced.

b) There are points in which the defences once constructed will sit on Common Good Land. This may be considered to be a change of use although the Council consider its duties to consult on such change of use under the Community Empowerment Act 2015 to have been discharged through the publication and consultation on the Scheme.

c) Further should the measures proposed by the Scheme not be implemented there may be greater detriment to the affected Common Good Land due to impact from flooding: against both current flood risk and the increased levels of flood risk that are projected due to climate change.

It is therefore considered that overall the Scheme will have a greater positive impact on the Common Good Land, and that this benefit will only increase as climate change is experienced in the coming decades.

d) Some concerns relating to this theme highlighted the risk of reduced access to Common Good Land during the construction phase. This is understood to be a real risk, and it is correct to assume that some areas of the Common Good Land will not be available for periods of time during construction. However this is not dissimilar to the situation that exists today for various reasons. A recent example is associated with the restoration works undertaken at the Ash Lagoons: during that construction works project and for prolonged periods of time areas of the Common Good Land were not available for use or access by the public. Aspects of this objection theme are dealt with through other theme responses in this report: the "Amenity, Health & Wellbeing" theme, and the "Impact on Accessibility" theme should be read in parallel to this theme.

4.31 **Impact on Adjacent Property**

a) There are concerns that the construction of the Scheme might result in damage to nearby properties. This is perhaps due to examples in the media and online. In fact, property damage as a direct result of nearby construction is rare.

b) The Scheme's EIA considered the possibility of damage to adjacent properties. The assessment was based on an understanding of the era when properties were constructed and the forms of construction used at that time, combined with an understanding of the likely construction methods which would be employed by the Scheme's contractor. The assessment concluded that with appropriate mitigation measures, such as vibration limits on all construction activities, there would be no predicted significant residual adverse effects resulting from the construction of the Scheme.

c) Nevertheless, it is anticipated that the Council would commission condition surveys of all adjacent buildings prior to the construction work commencing. In the unlikely event that damage were to occur to a property as a direct result of the construction of the Scheme, the Council would be required to repair the damage or pay for the cost of doing so. This is facilitated through provisions for compensation under the FRM.

4.32 **Impact on Accessibility**

a) The importance of public access to the natural and built environment is a key consideration of the Scheme's design. Access can refer to physical access to spaces such as rivers, beaches, and parkland by a variety of users such as pedestrians, dog walkers, wheeled users and horse riders. It can also refer to the ability to view and interact with the environment such as through fishing, bird watching or simply enjoying the scenery. Accessibility also refers to the variety of mobility needs that the public have.

b) Whilst reducing flood risk often necessitates changes to access arrangements, the Scheme has been designed in such a way to retain widespread access to the natural and built environment wherever practicable. Examples include:

i. Access to the River Esk for fishing via Haugh Park, Station Road, Olive Bank car park, Mall Avenue and Eskside West between Rennie Bridge and Electric Bridge;

ii. Beach access via frequent ramped access points spaced along the coastline between Fisherrow Links and Murdoch's Green;

iii. The ability to interact with nature through new wetlands near Eskmills Business Park, restored riverbank at Olive Bank car park, and raised footpaths on the proposed embankments at Eskside West;

iv. Uninterrupted views of the river via riverside access at the Grove near Eskmills, at Olive Bank car park, on the riverbank at Mall Avenue, and on raised footpaths on the proposed embankments on Eskside West between Rennie Bridge and Electric Bridge; and

v. Uninterrupted views of the Forth Estuary from the beach, via frequent ramped access points spaced along the coastline between Fisherrow Links and Murdoch's Green.

c) The detailed design phase of the Scheme will address particular aspects of accessibility such as:

i. Access to the beach and the River Esk for horses, particularly as part of the Musselburgh Festival;

ii. Access to the beach and the River Esk for emergency services; and

iii. Useability of ramps and steps by those with particular mobility needs.

d) Inevitably there would be temporary impacts on access during the construction of the Scheme, which would be evaluated in terms of the longer-term benefits that the Scheme would deliver. This would mean that parts of watercourses and the coast would be inaccessible for certain periods. However, given the scale of proposals spread across the town, not all parts of the Scheme would be under construction at the same time. It would therefore always be possible to access parts of the coast and riverside, either where works had yet to commence or where they were already complete. Once the detailed design is complete and a contractor has been appointed to construct the Scheme, it is anticipated that a phased construction programme will be developed and shared with the public.

e) In summary, the public's desire to access the environment during and after construction of the Scheme is recognised. Whilst the nature of that accessibility would necessarily change from what exists today, a variety of access options would exist, and the impact is considered proportionate to the benefits that the Scheme would provide.

4.33 **Impact on Public Rights of Way**

a) It is understood that some people have concerns about the Scheme's impact on public rights of way. In the course of delivering the Scheme it may become necessary to temporarily or permanently divert a public right of way. Depending upon the specific nature of the diversion, permission may be obtained under the Countryside (Scotland) Act 1967, The Roads (Scotland) Act 1984, the Road Traffic Regulation Act 1984, or the Town and Country Planning (Scotland) Act 1997. If such a diversion is required, the project team will have to submit an application to the Council's Planning Service.

b) It is not anticipated that any rights of way will have to be permanently closed as a result of the Scheme.

4.34 **Impact on public safety**

a) Some objections concern the Scheme's impact on public safety.

b) One concern relates to the risk of people becoming trapped on riverside of flood defences after gates are closed in response to a flood warning. This risk has been anticipated, and in due course appropriate operational procedures will be developed. Such procedures will, for example, ensure that flood gates are closed in a defined order. Notwithstanding these procedures, and the Council's duty of care in respect of operating the

Scheme, it is incumbent upon individuals to exercise precautions to ensure their personal safety in proximity to rivers and bodies of water.

c) Another concern relates to the risk of people climbing on top of flood defences and falling from height. This risk has also been anticipated and in due course the copes on top of flood walls will be designed to deter such behaviour. Notwithstanding this design feature, and the Council's duty of care in respect of operating the Scheme, it is incumbent upon individuals to behave in a safe and responsible manner.

d) Another concern relates to new footpaths being used by motorbike riders. Motorbikes are prohibited by law from being used on footpaths. The police are responsible for enforcement and instances of illegal behaviour should be reported accordingly.

4.35 **Impact on Vandalism and Graffiti**

a) It is understood that some people are concerned that flood walls would become susceptible to graffiti. Within the conservation areas all flood defence walls would be clad in stone on both sides, which would eliminate the issue of exposed plain concrete becoming a potential blank canvas. A general inspection of existing stone walls on Eskside West and Eskside East indicates that stonework is considerably less likely to be vandalised. Outside the conservation area, where flood walls are proposed, these would be formed with a patterned finish rather than a plain smooth finish. It is understood from flood protection schemes elsewhere, such as White Cart Water FPS, Broxburn FPS, and Selkirk FPS, that patterned concrete finishes can also effectively deter vandalism.

b) Whilst it is recognised that any new structure would introduce a potential risk of vandalism and graffiti, this is not seen as sufficient reason not to protect Musselburgh from flooding. Having determined that physical defences are an essential component in order to deliver the chosen standard of protection, the focus must be on ensuring that people choose not to vandalise them.

c) It is anticipated that the detailed design phase will include:

i. Appropriate lighting to avoid dimly lit areas;

ii. Placemaking and landscape design which promotes increased recreational use, thereby reducing secluded, isolated areas; and

iii. Public engagement events to promote a shared sense of ownership and pride in the new landscape, thereby reducing the desire to vandalise it.

d) It is recognised that, in the past, graffiti and vandalism have been an issue in some parts of Musselburgh. It is hoped that the Scheme and its public realm improvements would provide an opportunity to change people's relationship with the town's public spaces; to use them more frequently, at different times of day, for a wider variety of purposes, and with respect for other users. This is considered to be the best way to effectively address the risk of vandalism and graffiti.

4.36 **Impact on Surface Water Flood Risk**

a) It is understood that in some parts of Musselburgh, there are issues with road gulleys which back up during intense rainfall. Many of these gulleys and the sewers they are connected to are of considerable age and were not designed to accommodate higher flows. While the Council is responsible for cleaning and maintaining road gulleys, the sewers they discharge into are the responsibility of Scottish Water, who have a budget for operating and maintaining their assets. The Scottish Government has clearly indicated that whilst both organisations should coordinate their efforts to manage surface water flood risk, the government's National Flood Risk Management Programme, through which the Scheme is funded, must not be used to subsidise Scottish Water.

b) Backed up road gullies are perhaps the most frequent and visible example of surface water flooding. While this may be unsightly and inconvenient, the risk of property flooding due backed up gullies is relatively low. Road gullies and sewers in Musselburgh drain by gravity to a coastal pumped sewer network, where pumping stations at the mouth of the River Esk and at Eastfield convey sewage to the nearby Seafield WasteWater Treatment Works. The network's pump capacity means that during intense rainfall, surface water backs up until the peak has passed.

c) It is recognised that in some locations where surface water currently backs up during intense rainfall, it can spill over the riverbank or foreshore into the nearest watercourse. It is further recognised that constructing flood defence would inhibit this process. For this reason, The Scheme's design includes several automatic surface water pumping stations. These would be located at low points around the town, where surface water would naturally drain to. The pumping stations would discharge directly to the nearest watercourse via dedicated pipework, thereby managing surface

water flooding without adding to the overwhelmed sewer network. The intent would be to ensure that any residual surface water ponding was no deeper than would be the case without the Scheme in place.

d) It is recognised that the proposed series of automated surface water pumping stations would introduce a maintenance burden to the Council. Whilst the Scheme has been designed to minimise the need for maintenance, some aspects are unavoidable. The proposed solution respects the distinction between the Council's responsibilities and those of Scottish Water. The ponding surface water cannot drain away by gravity during a flood event and must not be added to the sewer network, therefore it must be discharged against gravity to a nearby watercourse. It should be noted that storage was considered but discounted due to the volumes of water involved and the presence of shallow groundwater.

e) In summary, it is considered that it would be inappropriate for the Scheme to address sewer flooding, which remains the responsibility of Scottish Water. By providing surface water pumping stations, which albeit introduce a maintenance burden, the Council would be able to manage surface water ponding by discharging directly to nearby watercourses without exacerbating the overwhelmed sewers.

4.37 **Impact of Narrowing the River Esk**

a) It is understood that some people have concerns about the impact that the Scheme would have in terms of narrowing the River Esk. New flood defences, which would be located in front of the existing river's edge, are proposed on the east side of the River Esk between the Rennie Bridge and the Ash Lagoons Seawall, and on the west side between Electric Bridge and the mouth of the river. There is a perception that these proposals would increase flood risk.

b) The shape of the River Esk has been altered on multiple locations for a variety of reasons, most recently after the 1948 flood. At that time, low height concrete training walls were constructed on both riverbanks from the Roman Bridge to a ford downstream, which was later replaced by the Electric Bridge. It is understood that these walls were intended to provide erosion protection and improve conveyance.

c) Prior to those works, the mouth of the River Esk was also altered between 1853 and 1893. At this point an area of mud flats to the west of Musselburgh racecourse was reclaimed and subsequently became the area known today as Goosegreen. River training structures were constructed on both riverbanks and these works had the effect of

narrowing the lowest stretch of the river and moving its mouth downstream from New Street to its current location at the end of Goosegreen Place.

d) Numerous factors influenced the design of the Scheme now being proposed. The defences on the east side of the river between Rennie Bridge and Electric Bridge would be positioned in the water immediately in front of the existing low training wall. This would avoid impacting the trees on the riverbank and the sewer beneath the footpath. Setting the defence back further would necessitate the removal of the trees and the diversion of the sewer. The defences on both riverbanks downstream of Electric Bridge would be positioned in the water immediately in front of the existing river training walls. These existing structures are in poor condition and cannot be relied upon to support flood defences located behind them.

e) Whilst the positioning of new flood defences in front of the existing training walls would narrow the river, albeit marginally, doing so would not increase flood risk. This is because, at these locations, the coastal flood risk plus climate change allowance is greater than the fluvial (river) flood risk plus climate change allowance. As a result, the design flood level and the required height of defences there would be determined by sea level and tidal surge and would therefore be unaffected by the width of the river. The width of the river would only affect the height of the defences further upstream where the fluvial flood risk is dominant.

f) In summary, the decision to narrow the lower stretch of the River Esk was carefully considered. Doing so would reduce the impact on trees and address the issue of deteriorating existing structures. Due to the dual risks of coastal and fluvial flooding, this approach would not increase flood risk to any properties or increase the height of flood defences required to provide the desired standard of protection.

4.38 **Impact on Coastal Squeeze**

a) Some people have expressed concern that the Scheme would cause ‘coastal squeeze’. Coastal squeeze is defined as ‘the loss of natural habitats or a deterioration in their quality caused by man-made structures or human activity’. In Musselburgh this would mean a loss of the intertidal habitat between Mean Low Water Springs (MLWS) and Mean High Water Springs (MHWS).

b) On Musselburgh’s coast, climate change induced sea level rise would cause MLWS to move inland. For there to be no loss of intertidal habitat if and when this occurred, MHWS would also have to be allowed to move inland. This process would involve erosion of the highest parts of the

beach and the emerging sand dunes, followed by erosion of the Promenade, Fisherrow Links, and perhaps ultimately the properties nearest the shore. It would also involve erosion of Scottish Water's pumped sewer network beneath the Promenade, which supports all the coastal communities in the area.

c) In light of the existing infrastructure and properties near the coast, the Council's current Shoreline Management Plan (SMP) includes a 'selective hold the line' policy for the coastline between Eastfield and the River Esk. In addition, Scottish Water has a statutory obligation to maintain the sewer network. Both of these factors mean that in the event of sea level rise and the resulting coastal erosion, steps would have to be taken to intervene. This means that, with or without the Scheme in place, coastal squeeze would occur.

d) Nevertheless, in anticipation of climate change induced sea level rise, it is assumed that the foundations of the Scheme's coastal defences would be designed to resist erosion and thereby fulfil the 'hold the line' policy. If and when coastal squeeze does begin to occur, it could be addressed in a number of ways, including beach nourishment to maintain the size of the intertidal area, or managed retreat elsewhere. It is highlighted that Council currently consider that such Coastal Squeeze could occur through natural processes if there is no Scheme; or through natural processes with a Scheme in place; or as a result of the Scheme; or through a combination of these logics. Such adaptive measures would need to be reactive rather than pre-emptive and therefore carried out at a point in the future rather than now as part of the Scheme. Consequently, it is anticipated that the Council's forthcoming Coastal Change Adaptation Plan (CCAP), which will replace the current SMP, may identify a range of such measures, as appropriate.

e) In summary, due to the 'selective hold the line' policy which exists for Musselburgh's coastline, climate change induced sea level rise would lead to coastal squeeze with or without the Scheme in place. It is therefore considered appropriate for the Scheme to contribute to holding the line, and for any coastal squeeze which occurs in the future to be addressed through the deployment of adaptive measures identified within the forthcoming CCAP.

4.39 **Impact on Coastal Erosion Risk**

a) Some concerns relate to the impact that the Scheme would have on coastal erosion. Coastal erosion can occur through various process, both natural and those induced by human activity.

b) The coastal flood risk from a present day 0.5% Annual Exceedance Probability (AEP), or 1 in 200-year, event is predominantly from wave overtopping. This means that for such an event, the current shoreline would be higher than the theoretical still sea level, but breaking waves would be liable to cause flooding to properties. The Scheme's proposed coastal defences would be designed with a wave return to manage the volume of water passing over the defences. In returning the waves, the defences would have to be carefully designed to ensure that this process does not result in erosion of the beach immediately in front of the defences.

c) Meanwhile, the projected climate change induced sea level rise would mean that by 2100, a 0.5% AEP coastal flood event would be higher than the current shoreline. This means that, rather than wave overtopping, the sea would inundate properties. The height of the Scheme's proposed coastal defences would be designed to contain this sea level. In this scenario the sea level rise would likely be the dominant cause of erosion rather than waves being returned by the defences.

d) It is anticipated that, in response to future sea level rise, further adaptive measures such as beach nourishment, would be necessary to address coastal erosion. Consequently, the Council's forthcoming Coastal Change Adaptation Plan (CCAP), may identify a range of measures, as appropriate.

4.40 **Impact on Flood Risk and Coastal Erosion Elsewhere**

a) It is understood that some people have concerns about whether the Scheme would negatively impact flood risk and coastal erosion elsewhere.

b) One key aspect of delivering a flood protection Scheme under the FRM is that it cannot meaningfully increase flood risk to any properties as a result. Jacobs' analysis of the Scheme's flood model confirmed that no property would be at greater risk of flooding with the Scheme in place compared to the risk that is currently experienced.

c) Similarly, there is no evidence that the design of the Scheme would result in increased risk of coastal erosion to properties compared to the risk that is currently experienced. Notwithstanding this, natural processes associated with coastal erosion are complex and the associated outcomes become less certain further in the future. These processes are affected by several factors, including sea level rise, sediment transportation, prevailing weather patterns, and other changes in nearby coastline.

It is anticipated that the Council's forthcoming Coastal Change Adaptation Plan will consider current and future coastal erosion risks, with or without the Scheme in place, and suggest a range of measures to respond and adopt to coastal change.

4.41 **Impact on Fish Passage**

a) Some concerns relate to the impact that the Scheme would have on fish passage on the River Esk, both during and after the construction phase. It is noted that in some instances there are already barriers to the passage of fish species, such as at Eskmills Weir and Goosegreen weir.

b) The proposals include the following measures to address impacts on fish passage during and after construction:

i. Improvements to the existing fish pass on Eskmills Weir;

ii. Restrictions on instream works during sensitive timings for salmonids between October and May;

iii. Screening of over-pumping equipment if instream dry working areas are required outside of restricted periods;

iv. Presence, during construction works, of an ECoW (Environmental Clerk of Works) with experience in freshwater environments; and

v. Avoidance of temporary culverting works where practicable.

c) In addition, it is intended that the detailed design phase will address the following:

i. Development of the design of the debris trap by Whitecraigs to facilitate a robust maintenance procedure which complies with the Salmon Act 1986 and the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003;

ii. Development of an appropriate riparian planting design which maximises shading for fish species at exposed locations;

iii. Development of the design generally in Musselburgh with consideration for continued access to the River Esk by authorised anglers; and

iv. Consideration of fish passage improvements at Goosegreen Weir as part of wider river restoration and reinstatement measures.

d) In summary, it is considered that with the identified mitigation measures put in place, and with the appropriate development of the Scheme during the detailed design phase, the risk to salmonids will be low.

4.42 **Impact on the spread of Invasive Non-native Species**

a) Some concerns have been raised about the impact that the Scheme, particularly its construction, would have on the spread of Invasive Non-Native Species (INNS). This potential was identified during the scoping stage of the Scheme's EIA and subsequently assessed. The results of that assessment are included within the EIA Report (Chapter 7 - Biodiversity).

b) Japanese Knotweed, Giant Hogweed, and Himalayan Balsam are prevalent within the proposed site area, particularly along the banks of the River Esk, adjacent woodland, and the Pinkie Burn. At the commencement of the project in 2016 the area known as 'The Valley', to the south of Inveresk Industrial Estate, was also found to contain significant amounts of Giant Hogweed but has since been subject to management by the Council. Similarly, many of the areas are now being treated annually through the efforts River Esk INNS Management Steering Group which is coordinated by the Scheme. It is recognised that a failure to manage the spread of INNS could result in a reduction in biodiversity elsewhere through loss of habitat, reduction in species richness and a loss of species which the habitats support.

c) The construction of the Scheme would be required to comply with the Wildlife and Countryside Act 1981, and the construction methods used would require to have due consideration for the Scottish Government's Code of Practice on Non-Native Species. It is considered that with appropriate mitigations measures in place, the Scheme can be constructed without contributing to the spread of INNS.

4.43 **Impact on Interests in Land**

a) It is understood that some objections relate to having an interest in land which would be affected by the Scheme, such as the banks of the River Esk, the coastal foreshore, Fisherrow Links and other amenity spaces. It should be noted, however, that in the context of the FRM, the term, 'interest in land', refers to land for which the individual is an owner or occupier i.e. they have a legal interest. In this context, therefore, members of the public do not have a legal interest in land which is owned by the Council.

b) The Scheme will require to temporarily occupy space during its construction. This occupied space is currently identified as the ‘Limit of Construction’ and in due course it will become the ‘Site Boundary’ of the construction works. It is intended that this land will be occupied under the powers defined in Section 79 (Powers of Entry) of the FRM. If there is an interest in such land from a private landowner then, as appropriate, they may seek compensation for any loss under Section 82 (Compensation) of the FRM. This report highlights that Council do not intend to impose such powers on private landowners, and that all occupation of land is intended to be coordinated in a mutually acceptable way.

4.44 **Impact on Property Market**

a) Some people have expressed concern about the negative impact that the Scheme would have on house prices and rental incomes due to visual impact, loss of trees, changes in access, amenity etc. as well as temporary effects during construction period. This theme is closely linked to the “Approach to Compensation” theme and an expectation that they will be compensated for this impact on the property market. The concerns raised within this theme relate to:

i. The temporary impact that construction of the Scheme would have on house prices and rental incomes nearby; and

ii. The permanent impact that the Scheme would have on house prices and rental incomes nearby due to visual impact, tree loss and changes to amenity areas.

b) Within a project of this nature there is a wide range of different types of impacts that could be caused by flooding. The impacts can be arranged into three categories:

i. Economic impacts - Property damages, emergency costs, infrastructure, transport, agriculture, land use, indirect impacts, cost or availability of insurance;

ii. Environmental impacts - Ecosystem services, landscape, change in status under the Water Framework Directive, changes in condition of protected nature sites; and

iii. Social impacts (including human health and cultural heritage) - human health and well-being, way of life, cultural heritage.

c) Since the FRM was enacted, Local Authorities across Scotland have invested in flood protection schemes which are designed to reduce or limit (insofar as possible) the damage and disruption caused to homes, businesses, and infrastructure from flood events. Properties at risk of flooding would have these negative effects mitigated after the introduction of a flood protection scheme. In Musselburgh the outline design proposed will reduce the risk of flooding to approximately 3,200 properties from a major flood event, and thereby all smaller flood events up to that larger design flood event.

d) It is considered that the failure to deliver a flood protection scheme against the known and modelled flood impact and risk will have a far greater impact on the economic vibrancy and investment within Musselburgh. It is understood that as the risk of flooding increases in the future due to climate change that its impact on planning applications, insurance cover and the ability of businesses to continue to operation would increase.

4.45 **Impact on Local Businesses**

a) Some people have raised concerns that the construction phase of the Scheme will negatively affect local business as there will be fewer customers and large amount of disruption. There is also the concern that the completed Scheme will make the town less appealing and remove amenities that will result in fewer people visiting / living there, which as a result will negatively affect local businesses. Some of these objections are linked to tourism and that as a result of the Scheme, less people will be attracted to visit Musselburgh and that this will ultimately have a negative effect on local business.

b) The Scheme has been designed to allow it to deliver multiple benefits for Musselburgh which will have a positive impact on those that live, work and visit the Town. The multiple benefits include:

i. The Musselburgh Active Toun (MAT) project;
ii. Musselburgh River Restoration; and
iii. Repair works to the Ash Lagoons Seawall.

c) It is highlighted that the proposed flood risk reduction operations of the Scheme are located at a number of locations in the River Esk Catchment, including at Rosebury Reservoir, Edgelaw Reservoir and at Cowpits by Whitecraig. It is not considered that these Scheme Operations will have any significant impact on business in Musselburgh. Similarly, it is highlighted that the repair works to the 2.7km long Seawall are intended

to be accessed via an existing track by Morrisons Haven near Prestonpans. This work is currently estimated at approximately 50% of the whole works by cost, and it is not considered that this work will have any impact on business in Musselburgh.

e) It is considered that the failure to deliver a flood protection scheme against the known and modelled flood impact and risk will have a far greater impact on the economic vibrancy and investment within Musselburgh. It is understood that as the risk of flooding increases in the future due to climate change that its impact on planning applications, insurance cover and the ability of businesses to continue to operation would increase.

4.46 **Impact on Investment Elsewhere**

a) Objections in respect of this theme related to the impact that the Scheme would have on the Council's investment elsewhere, including The Brunton Theatre, The Hollies, the Sports Centre, and the Library. The funding and budget for the Scheme is a Capital Investment. The Scottish Government is contributing 80% of the cost of the Scheme. This is committed to flood protection schemes and if not invested in Musselburgh's Scheme it will be used elsewhere in Scotland on a different flood protection scheme. The remaining 20% funding comes from Council as the Local Authority that is promoting this scheme.

b) This Scheme, and the Council's approach to investment in Musselburgh, continues to achieve multiple in accordance with the 'One Council' approach of East Lothian Council – i.e. Council continues to 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.

c) Council investments to maintain and upgrade the existing assets may come from the Council's Capital or Revenue Budgets.

4.47 **Impact on Areas of Social Deprivation**

a) Some objections assert that *"wealthy landowners should be implementing upstream natural flood management to reduce flow of water coming into the town. Instead, people of a lower socioeconomic profile will be disadvantaged with a concrete wall flood scheme that sacrifices their access to nature"*.

b) The potential use of Natural Flood Management (NFM) is addressed earlier in this report. The scale of Musselburgh's flood risk far exceeds the

demonstrated capability of catchment-based NFM. The issues associated with land ownership, uncertainty, and reliability outweigh the modest flood risk reduction benefits that NFM could deliver by itself. Nevertheless, the Council has committed to further investigation of NFM as part of a long-term managed adaptive approach through the Local Flood Risk Management Plan. This pathway to explore possible NFM and other Nature Based Solutions in the Esk Catchment derived authority from a report to Council on the Scheme in October 2023 and it is highlighted that it is understood that a further report to Council will be required before further commitments to NFM investment are formally committed to. It is also noted that NFM would not address the significant coastal flood risk associated with climate change induced sea level rise.

c) It is acknowledged that physical defences within the town would change the landscape and have a visual impact. However, elevated embankments will facilitate views, and improvements to paths and public spaces will provide new features and interest adjacent to the river. It is considered that the impact would be proportionate to scale and complexity of the Scheme and that, on balance, it would be acceptable in terms of the benefits resulting from reduced flood risk.

d) In terms of considering impacts on relatively deprived groups within the community, Chapter 6: Population and Human Health of the EIA Report considered such impacts and identified specific areas where such groups would likely be adversely affected. With regard to relatively deprived communities and their "access to nature", it considered '*outdoor recreation and access to green and blue spaces'*, and concluded that enhancements to amenity spaces such as Mall Avenue, the north of Fisherrow Park, Fisherrow Harbour and Murdoch's Green would benefit the community and create more usable practical, and safe spaces.

e) The EIA also noted that the Scheme would protect people with high sensitivity to poor health outcomes, such as those will existing mental health conditions, the elderly and income deprived, who would have less capacity to cope with a major flood event and therefore who would stand to benefit more in terms of health from the additional level of protection offered by the Scheme. It also identified potential opportunities associated with constructing the Scheme, in terms of employment and training opportunities, which would align with the council's Procurement Strategy 2023/28.

4.48 **Impact on Dalkeith Country Park**

a) Some people have expressed concern about the impact that the Scheme would have on Dalkeith Country Park. The proposed debris trap on the River Esk near Whitecraig would be within the estate and would be accessed via a field near an equestrian centre. Concerns relate to:

i. potential impact on livestock in nearby fields;

ii. potential impact on horse riding on the farm road;

iii. potential impact on horse riding on the woodland path; and

iv. traffic congestion on the farm road due to construction traffic and maintenance vehicles.

b) Construction of the debris trap itself would be in the woodland surrounding the River Esk, where it is anticipated this would have minimal impact on livestock. It is however acknowledged that there would be temporary impact on the use of the woodland path by horse riders. The construction of access would involve widening the existing farm track at the edge of the field and extending it to the far end of the field nearest the river. Construction of the access is anticipated to be of short duration.

c) In terms of potential traffic congestion and other impacts on the farm road during construction, it is anticipated that a traffic management system would be developed by the contractor in partnership with Buccleuch Estates and its tenants. The construction of the debris trap and its access is not anticipated to involve large volumes of traffic. Once constructed, maintenance traffic is expected to be infrequent and only in response to flood events. The detailed design will likely include remote monitoring facilities to avoid the need for frequent inspection of the debris trap on site.

d) In terms of safety, the working area would be segregated with appropriate livestock fencing.

4.49 **Impact on the Roman Bridge and the Rennie Bridge**

a) Some concerns relate to the impact that the Scheme would have on the Roman Bridge and the Rennie Bridge, particularly in respect of their historic setting and how the flood defences would tie into these structures. The Roman Bridge is a category A listed structure, and the Rennie Bridge is a category B listed structure. Works in proximity of both of these will require listed building consent to be obtained in addition to the Scheme's consent under the Flood Risk Management (Scotland) Act 2009. The

Scheme, insofar as it is relevant to these bridges, was developed in consultation with Historic Environment Scotland and the Council's planning service. Their feedback during the outline design process influenced the alignment of the defences and how they would interact with the bridge structures.

b) The view of the Roman Bridge steps from Market Street and Eskside West would be retained by having the flood defence tie into the bridge rather than wrap around it. Similarly, on eastern side, the defences would tie into the bridge to minimise impact on the views of the bridge from Mall Avenue, Olive Bank Road and Inveresk Road. On both sides of the river, both upstream and downstream, it will be possible to see the Roman Bridge over the defences due to their low height. In keeping with the historic setting, all flood walls in proximity to the bridge will be clad in stone on both faces.

c) On the west side of the Rennie Bridge the defences will tie into its parapet walls at high ground on the junctions with Eskside West and Bridge Street. On the east side, the defences will tie into the pier adjacent to the water's edge, thereby retaining the dry arch on the protected side of the defences. On both sides of the river, both upstream and downstream, it will be possible to see the Rennie Bridge over the defences. In keeping with the historic setting, all flood walls in proximity to the bridge will be clad in stone on both faces.

d) In terms of structural impact, where the defences tie into the bridges this would be a non-structural connection with a full movement joint and watertight seal. This would ensure that no structural loads were transferred between the flood defences and the bridges.

4.50 **<u>Impact of Embankments at Eskside West</u>**

a) The Scheme includes flood embankments adjacent to Eskside West between Rennie Bridge and Electric Bridge. Each embankment would be positioned on the riverbank in front of the existing line of trees and would include a new footpath on its crest. This evolved as the preferred solution at this location is a result of extensive consultation with the public between 2020 and 2023.

b) Initially the proposal at this location had been for a flood defence wall, set back from the water and located at the edge of the existing footpath, with most of the existing trees to be removed to facilitate this. The aim of this option had been to minimise the height of the defence by locating it as high on the riverbank as possible. Members of the public subsequently raised

concerns about the loss of trees and the visual impact resulting from the widespread use of walls as a form of defence.

c) In response to the concerns raised, and in accordance with the consultative approach taken through the design development, in particular through the Local Area Consultation groups, the Council instructed Jacobs to investigate possible alternatives. Embankments generally have a much larger footprint than flood walls, which can often limit their feasibility, but in this instance the width of the riverbank meant that sufficient space was available. Locating the embankment towards the centre of the riverbank also meant that the need to remove trees could be vastly reduced. In order to retain the ability to enjoy views of the River Esk, a footpath on the crest of the embankment was proposed.

d) Some concerns have been raised about a perceived loss of privacy in terms of pedestrians on the embankment footpath having a view into properties. The new footpath would be more than 25m from the properties and they would also be separated by the canopy of the existing line of mature trees adjacent to the road. Meanwhile, the existing roadside footpath directly outside these properties is less than 7m from the front of the properties and provides uninterrupted views of the ground floor windows. It is therefore considered that there would be no loss of privacy associated with the proposed embankment.

e) Other concerns raised include the fact that most of the riverbank would be occupied by the embankment, and that the introduction of a third footpath in addition to the existing roadside footpaths would be unnecessary. It is recognised that an embankment would occupy more space on the riverbank than a wall would, but this is one of many trade-offs within the design and was considered appropriate in order to reduce the extent of flood walls. The inclusion of the footpath was also considered appropriate in order to provide views of the river and maintain connectivity with the riverside environment.

4.51 **Impact on Fisherrow Harbour**

a) Some objections concern the impact that the Scheme would have on Fisherrow Harbour, in terms of its historic importance and the character of the surrounding area. The harbour is a category B listed structure, and any work to it or its setting would require Listed Building Consent in addition to the deemed planning consent that the Scheme would provide.

b) The design of the proposed defences either side of the harbour are intended to compliment the current historic setting of the structure. This

would include stone cladding on the dry side of the defences in proximity to the harbour walls.

c) The design of the Scheme's approach to flood risk reduction at this location underwent a number of evolutionary steps further to direct engagement with the Fisherrow Harbour & Seafront Association (FS&HA) in accordance with the process for identification of multiple benefits as authorised by Council. Initially it was intended that the flood defences at this location would be set-back (on the town side of the harbour) however during the outline design, and through a unique harbour options appraisal process undertaken with FS&HA, it was determined that their preferred approach was to include the harbour itself in the flood defences (and thereby the Scheme). The proposals therefore include repairs to the harbour walls, such as repointing of mortar and replacement of damaged masonry. This is intended to provide benefit to the existing harbour walls by extending its lifespan without alterations.

d) It is considered that the proposals will have a neutral or positive impact on Fisherrow Harbour in terms of necessary repairs to the harbour itself and complimentary coastal defences on either side.

4.52 **Impacts on Numbers 9 to 27 Edinburgh Road**

a) It is understood that the proposed flood defence behind numbers 9 and 27 Edinburgh Road is one of the most sensitive within the Scheme in terms of its potential social impact. The rear gardens of these properties back directly onto Musselburgh Beach (the Backsands). Only a physical barrier at this location would adequately address the flood risk posed by sea level rise associated with the Scheme's chosen climate change scenario. Because of this challenge with the design the Project Team an extensive consultation with the property owners and occupiers of these properties.

b) Consequently, to protect these properties, the flood defence would either have to be on the beach, on the line of the property boundaries, or within the back gardens of the properties. The advantages and disadvantages of these options were discussed with residents during meetings in October 2022, February 2023 and culminated in a site visit to the properties in April 2023. The latter two options would result in substantial disruption to boundary structures, gardens, and outbuildings over a period of several months, and would require substantial reinstatement afterwards. Following the consultation with residents, the Council decided that the preferred option was a flood defence wall located as close to the property boundaries as possible to minimise permanent impact on the beach but offset far enough from the properties to enable its construction without

temporary impact to boundary walls, fences, gardens and outbuildings. This resulted in the defence alignment being approximately 5m from the property boundaries. The void between the new flood defences and the existing property boundaries would be reinstated with sand and coastal planting similar to what currently exists.

c) It is understood that the Scheme's potential impact on privacy and security is of prime concern to the residents. Currently there is uninhibited public access from the beach right up to the existing property boundaries. Boundary structures vary from property to property, ranging from low-height glass panels to brick and masonry walls exceeding 2.5m high. The proposed flood defence will not increase public accessibility to the existing property boundaries, and the proposals do not include any footpath or public walkway between the proposed flood defences and the existing boundary structures. Consequently, upon completion, the new flood defence will have a neutral impact on privacy and security.

d) It is understood that some properties currently enjoy direct access to the beach via gates or doors in their boundary structures. Notwithstanding this, the project team is unaware of any formal rights of access associated with the title deeds of these properties. Whilst there are no proposals for the Scheme to alter any of the existing boundary gates and doors, it is recognised that the proposed flood defence will affect residents' access to the beach. There is a fine balance to be struck between maintaining beach access and also maintaining privacy and security. Consequently, the Scheme proposals include improved beach access at Murdoch's Green and Back Sands car park.

e) In conclusion, change is necessary to reduce Musselburgh's flood risk. Various options were considered to achieve that objective, and each option had associated potential impacts in terms of security, privacy, access, and disruption. It is considered that, on balance, the chosen option behind numbers 9 to 27 Edinburgh Road represents the best possible solution. It is highlighted that at this location discussions require to be continued with the owners and occupiers of these properties to finalise the detailed design of the land between the new flood wall and the existing boundary wall. It is intended that this consultation will develop a design that is to the mutual satisfaction of both the Council and the property owners and occupiers.

4.53 **Impact on Inveresk Estate and the Grove**

a) Some people have raised concern about the impact that the Scheme would have on Inveresk Estate and the area known as the Grove.

b) Analysis following updated climate change data identified that some properties in Inveresk Estate are at risk from the 1 in 200-year flood event. While these homes have an existing stone boundary wall, it is known to be incapable of resisting floodwater. Previous high flow events have breached the wall and flooded gardens.

c) From approximately autumn 2021 the Council and Project Team engaged with the owners and occupiers of key properties at flood risk in this area such that an appropriate approach to reducing their flood risk could be developed. This initially assumed that the existing boundary wall would be replaced with a new flood wall. It was recognised that residents wanted to retain the existing historic wall and mature trees within their properties. As a result, the Scheme's proposals include a new stone-clad flood wall which would wrap around the outside of the existing wall, avoiding the need to take down the existing structure or the trees within the gardens. This approach also removes the need for construction occupation of these private gardens. It is considered that this evolution of the design has mitigated the key risk identified by the local property owners and occupiers during the design development.

d) During the construction phase there would be temporary impacts to access along the riverside path, however this would be reinstated upon completion.

4.54 **Impact on Pinkie St Peters Primary School**

a) Some objections relate to the impact that the Scheme and its construction would have on Pinkie St Peter's Primary Scheme and its pupils.

b) The works proposed as part of the Scheme would be located in the northern part of the School's playing fields, remote from the school building. While construction works can involve some degree of noise and dust, no adverse effect at the school building is anticipated. It is noted that other construction works have been carried out successfully recently and were much closer to the building than is proposed for the Scheme.

c) In terms of disruption to the playing fields themselves, the alignment of the defences was chosen to minimise the permanent impact. It is anticipated that, given the length of defences in this area, the works would be phased to minimise impact during construction. This means that not all parts of the works within the playing fields would be simultaneously under construction.

d) In terms of safety, the working areas will be securely fenced off from pupils and the public. It is anticipated that community engagement events with the school will be organised by the contractor to highlight the importance of staying out of construction sites.

e) In summary, it is considered that any temporary disruption to the school would be minimal and that, on balance, the impact of the Scheme is proportionate to the benefit of reduced flood risk.

4.55 **Impact of Reducing the Water Level at Edgelaw Reservoir**

a) It is recognised that there are concerns about lowering the water level at Edgelaw reservoir, and the impact this would have on fishing and public safety around the reservoir's perimeter. During the Scheme's option appraisal stage, lowering the water levels at Rosebery and Edgelaw reservoirs was identified as a means of increasing attenuation in the Esk catchment and thereby reducing the peak flow in the River Esk during a storm. This would have the effect of reducing the required height of flood defences in the town. Repurposing two existing reservoirs in this way was deemed a sustainable and cost-effective measure.

b) Alternative forms of attenuation were also considered during the options appraisal. The use of other existing reservoirs in the catchment was discounted because they form part of Scottish Water's water supply network. Rosebery and Edgelaw reservoirs however are not used for water supply and were constructed in the 19th century to supplement the flow of water in the River Esk during dry periods to maintain power to Musselburgh's mill industry. The possibility of constructing new reservoirs in the catchment was also considered but later discounted due to limited suitable locations and the significant environmental impact and cost.

c) Edgelaw reservoir is currently owned and maintained by Scottish Water. Since the reservoir no longer serves any operational purpose, they generally maintain the water level at the level of the overflow weir, however they retain the ability to lower the water level, if necessary, by using the control valves within the dam. This could be done for a variety of reasons such as to conduct maintenance on parts of the dam, or to supplement flow downstream during dry periods.

d) As part of the Scheme, the Council has proposed to lower the normal operating water level by 2 metres. This would be achieved by constructing a new overflow control structure, located 2 metres lower than the existing herringbone masonry overflow weir. As part of the proposals, the newly exposed banks would be revegetated, and piers or jetties would be

extended accordingly. The details of these supplementary works will be developed in consultation with the relevant stakeholders during the detailed design of the Scheme.

e) It is considered that with appropriate mitigation measures in place, the water level in the reservoir can be lowered while maintaining public safety and access for fishing and recreation.

4.56 **Impact on Advertising Consent for new Historical Information Panel**

a) One objection relates to an advertising consent which has been obtained for a new historical information panel to be located on land east of the public car park in Olive Bank Road. With the agreement of the owner of the information board, it Is intended that measures will be taken during the construction phase either to store the information board and reinstate it in its original location (or thereby); or to relocate it to the mutual satisfaction of the owner and the Council.

4.57 **Influence of Dynamic Coast**

a) During the consultation period between 2020 and 2023, members of the public asked whether the work being done elsewhere in Scotland by Dynamic Coast could be relevant to Musselburgh and the development of the Scheme. Dynamic Coast is funded by the Scottish Government, NatureScot, Centre of Expertise for Waters, and the St Andrews Links Trust. The project aims to, "provide the strategic evidence base on the extent of coastal erosion in Scotland by improving the evidence on coastal change, improving awareness of coastal change, and supporting decision-makers to ensure Scotland's coast and assets can adapt to our future climate". More information on Dynamic Coast's work can be found at https://www.dynamiccoast.com/.

b) The Council committed to exploring the work of Dynamic Coast further, and subsequently commissioned them to undertake an assessment of Musselburgh's coast. The aim of this commission was to inform the design of the Scheme and to identify additional coastal management works that might be undertaken in the longer term to supplement the Scheme as part of a risk-based managed adaptive approach. The intention was that such additional coastal management works could be incorporated into the Council's forthcoming Coastal Change Adaptation Plan (CCAP) for the area.

c) Dynamic Coast's assessment concluded that parts of Musselburgh's coast are at risk of erosion from climate change induced sea level rise, with some

evidence that this has already begun to occur since 2018. It also confirmed what was already suspected by the Council – that the Scheme's proposed defences and their foundations need to be designed to account for this erosion risk. Furthermore, it recommended that the Council should consider developing and appraising a range of coastal resilience measures as part of the CCAP. They also recommended that if combined with a monitoring programme of Musselburgh's coast, these measures could then be deployed at some point in the future where defined trigger points were reached.

d) In summary, it is considered that the proposed Scheme is compatible with the assessment undertaken by Dynamic Coast. The outline design of the Scheme was developed by Jacobs with the intention that the outcomes of the assessment could inform the detailed design phase and also future complimentary measures as part of the forthcoming CCAP.

4.58 **Influence of Musselburgh Active Toun (MAT) Project**

a) Musselburgh Active Toun (MAT) project is being advanced by the Council with a view to delivering new and improved spaces for walking, wheeling and cycling; making it easier and safer to travel actively for key journeys in and around Musselburgh. The MAT project is not part of the proposed Scheme that was notified in March 2024 under the FRM. Notwithstanding this, some Scheme operations, as well as reducing flood risk, would also have the potential to provide functionality for the MAT project if it were to be taken forward in the future.

b) For example, the four footbridges which the Scheme proposed to replace and / or relocate to reduce flood risk could also become part of active travel routes in the future. Therefore, where appropriate in terms of cost, environmental impact, and other relevant factors, it was legitimate for the footbridges to be designed to accommodate the likely future performance requirements of the MAT project as well as the immediate performance requirements of the Scheme. This meant providing wider decks to accommodate cyclists and other wheeled users as well as pedestrians. It should be noted that the proposed ramp gradients and lengths would be the same even if the requirements of the MAT had not been considered.

c) This approach of considering the implications of other known projects represents industry best practice in terms of anticipating the likely changing performance requirements of public infrastructure during its design life. In practical terms for the example given, it would avoid the need to replace the footbridges a second time at a later date with a wider deck to meet the additional performance requirements of the MAT project.

d) In summary, whilst the Scheme operations, as proposed, incorporate some of the anticipated future performance requirements of the MAT project, all the Scheme operations are required for the purpose of reducing flood risk. If the Scheme is confirmed under Paragraphs 4(1), 7(4) or 9(1) of Schedule 2 to the FRM, then the Scheme operations may legitimately receive deemed planning permission under section 57 of the Town and Country Planning (Scotland) Act 1997 as modified by section 65 of the FRM.

e) In accordance with industry guidance, the Scheme's EIA adopted a precautionary approach by considering the possible 'in combination' impacts if both the Scheme and the MAT project were constructed at the same time. Although the two projects are distinct in terms of funding, consenting and design, it is appropriate to consider such a scenario, since a combined construction approach would likely achieve added value through economies of scale, alongside minimising the impact of separate construction works on the environment and people of Musselburgh.

4.59 **Influence of Coastal Change Adaptation Planning (CCAP)**

a) Some objections concerned the Council's intention to develop a Coastal Change Adaptation Plan (CCAP) to replace its existing Shoreline Management Plan, and the assertion that the Scheme should not have been notified before this was complete. In the course of delivering large infrastructure projects such as the Scheme, their lengthy duration often means they coincide with other plans and strategies being developed by the local authority. It would be impractical for such projects to stop until those plans and strategies are complete. Instead, it is good practice for those working on each activity to coordinate their efforts and understand each other's objectives. In this instance this is achieved because, the Council's flooding officer, amongst other Council officers, is involved the delivery of both the Scheme and the CCAP.

b) In Musselburgh, the coastline between the Brunstane Burn at Eastfield and the River Esk contains existing infrastructure such as houses, the category B listed Fisherrow Harbour, the promenade, a regional pumped sewer and two associated sewage pumping stations. To the east of the River Esk lies the Ash Lagoons Seawall. The Council's existing Shoreline Management Plan adopted a selective 'hold the line' approach west of the River Esk, and a 'hold the line' approach at the seawall. Accordingly, the alignment of the Scheme's defences would be set back as far as possible from the Firth of Forth while still protecting the infrastructure noted above.

c) It is anticipated that the CCAP could identify a range of adaptive measures, which could be implemented to mitigate coastal risks. It is recognised that, due to the scale of Musselburgh's current flood risk and the extent to which this could increase due to the effects climate change, such adaptive measures in isolation would be unlikely to provide an equivalent standard of flood protection to that afforded by the Scheme.

d) In summary, the Scheme has been designed in accordance with the current 'hold the line' policy. It is anticipated that this policy would be maintained by the CCAP due to the presence of infrastructure with historical significance and regional importance. The Scheme has been designed in such a way that it would not impede the deployment of further adaptive measures on its seaward side at some point in the future.

4.60 **Approach to Public Consultation**

a) The public's desire to participate in shaping the Scheme is fully understood. Between 2019 and 2024 the public were consulted at a wide range of events, including public exhibitions, town hall meetings, workshops, online meetings, and one-to-one drop-in sessions. This was one of the most extensive programmes of consultation for any flood protection scheme in Scotland. The aim of the consultation was to provide written and visual information, engage in constructive discussion, and obtain feedback from the public on various aspects of the design. Notwithstanding this, as with many infrastructure projects of this scale and complexity, there were practical limits to how much the public could reasonably participate directly in the design process.

b) To deliver the Scheme, the Council commissioned Jacobs, an internationally recognised design consultant with extensive knowledge and expertise of engineering, flood risk management and environmental impact assessment. Their remit was to develop a Scheme which achieved the Council's objectives and took into consideration the public's feedback. Consequently, the proposed Scheme published in March 2024 was demonstrably influenced by the collective feedback received. This does not mean, however, that it was possible to achieve everyone's aspirations.

c) Throughout the outline design phase of 2020 to 2024 the Council provided information to the public through a variety of communication methods. The Scheme's website provided updates on the status of the Scheme, background information, and served as a repository for relevant documents produced by the project team in the course of developing the design. Newsletters were regularly distributed to all properties in the EH21 postcode area, providing updates and commentary on the Scheme's

progress. Furthermore, consultation events were advertised in the local newspaper and on the Council's social media channels. Notwithstanding this, it was decided that the Council would not engage with individuals through unregulated social media channels such as private Facebook pages and Twitter feeds.

d) It is recognised that some people would have liked the publication in March 2024 to include a choice of options. Unfortunately, to do so would have been impractical and disproportionately costly, since multiple designs would need to have been developed, each with their own environmental impact assessment. Moreover, that approach would have been incompatible with the FRM, which obligated the Council to present a specific proposal rather than a choice of multiple options. To present options would have introduced ambiguity about what approval was being sought for.

e) It is also recognised that some people would have liked a more active role in the decision-making process. This too would have been incompatible with the FRM. The FRM establishes a process whereby individuals have an opportunity to make objections or representations in respect of the proposal, and thereafter the Council must make a decision. It is considered that reaching a consensus on such a complex and contentious subject would be unrealistic, and therefore the most appropriate method, for which there is a clear legal precedent, is for decisions to be taken on behalf of the community by the democratically elected members of the Council.

f) In summary, the diverse range of views held by the public about many aspects of the proposed Scheme is fully recognised. Every potential option to reduce flood risk would have advantages and disadvantages. Each of these options would likely be supported by some people and opposed by others. It is considered that the consultation process complied with the law and was consistent with the precedent established by other local authorities in the course of promoting other flood protection schemes across Scotland. Consequently, the proposed Scheme is considered to be a proportionate response to Musselburgh's flood risk, and the best practicable Scheme in terms of balancing its impacts and benefits.

4.61 **Approach to Scheme Notification**

a) Schedule 2 to the Flood Risk Management (Scotland) Act 2009 (the FRM) states that,

"The local authority must make a copy of the scheme documents available for public inspection in a place in the authority's area. Where the proposed operations are to be carried out in another local authority's area, the authority must also make the scheme documents available for public inspection in a place in the other authority's area. The scheme documents must be available for inspection at all reasonable times during the period from the date notice is given."

b) The FRM also states that,

"objections can be made about the proposed scheme to the local authority before the expiry of the period of 28 days beginning with the date notice is first published".

c) In addition to the FRM, The Flood Risk Management (Flood Protection Schemes, Potentially Vulnerable Areas and Local Plan Districts) (Scotland) Regulations 2010, as amended, states that the local authority must use,

"a website for the purpose of making information available to the public on each scheme proposed by it which is subject to an environmental impact assessment",

and

"that any person wishing to make any representations about the EIA report may do so in writing to the local authority before the expiry of the 30-day period".

d) In compliance with the above requirements the Council made the documents available in print copy at the Brunton Theatre in Musselburgh and at the Council's offices in John Muir House in Haddington, both in East Lothian. They were also available in Dalkeith Library in Midlothian. The documents remained at all three locations in excess of the 28-day and 30-day periods required. In addition, the documents were available to view on the Scheme's website at www.musselburghfloodprotection.com.

e) With regard to the availability of the Scheme documents in other accessible formats, the published flood order notice stated that the Council would:

"consider requests for documents in other accessible formats. Please send any such requests to: Structures & Flooding, East Lothian Council,

Penston House, Macmerry Industrial Estate, Macmerry EH33 1EX. or via email to musselburghfps@eastlothian.gov.uk"

f) With regard to the cost for purchasing printed copies of the Scheme documents, it is considered that the cost specified was a reasonable reflection of the labour, administrative, and material costs associated with providing such copies, and that it met the precedent established by similar Schemes previously notified under the FRM elsewhere in Scotland.

g) With regard to the suitability of language within the Scheme documents, it is noted that the subject matter is inherently technical in its nature, and complex due to the scale of the proposals. In this respect the documents met the precedent established by similar Schemes previously notified under the FRM elsewhere in Scotland.

h) In summary, it is therefore considered that, in respect of the availability of Scheme documents for public inspection, the period during which objections or representations could be made, the cost for obtaining copies of the documents, and the language contained within the documents, the Council fully complied with the requirements of the FRM and the Regulations.

4.62 **Approach to Freedom of Information (FOI) Requests**

a) It is understood that some people have indicated concerns around information requests and the Council's processes and policies relating to these requests for information. In relation to this matter these concerns do not directly relate to the design of the Scheme itself. All information required for the statutory consultation on the Proposed Scheme, undertaken in accordance with the requirements of the FRM, was published on 21st March 2024. In accordance with the FRM this information is all that is required to provide sufficient information to the public to consult on the Proposed Scheme.

b) As stated above this concern does not directly relate to the design of the Scheme itself therefore it is not considered to be an objection to which a revision to the Proposed Scheme could be delivered. The Council will continue to provide information through the Scheme's Website. Information requested which is not available through that website will be assessed under the Freedom of Information (Scotland) Act 2002 (FOIs) and the Environmental Information (Scotland) Regulations 2004 (EIRs), as appropriate. The majority of information relating to this project will come under the definition of Environmental Information as stated under the

EIRs. Any information request received by the Council will be considered in line with the Council's FOI/EIR policies and handled accordingly.

4.63 **Approach to Compensation**

a) Some objections raised concern about an anticipated loss of amenity, enjoyment of land, damage to property, and loss of income due to the Scheme, and sought clarity on the process for obtaining compensation. The FRM confers powers on the Council to enter land and carry out any operations to which a flood protection scheme relates and an accompanying duty to compensate any person who has sustained damage in consequence of this. Claims for compensation are dealt with in terms of sections 82 and 83 of the FRM.

b) This report highlights that the Council are fully aware of their obligations under the FRM in relation to compensation and that in due course a process will be established to record and review any claims for compensation received.

4.64 **Approach to Operation and Maintenance**

a) People have asked how the Scheme will be maintained once it is constructed. The Operation & Maintenance (O&M) of the Scheme has been a key factor in the development of the design. Relevant considerations include:

i. **Who would fund O&M?** Under the current funding arrangement, the Scottish Government would fund 80% of the design and construction costs and the Council would fund the remaining 20%. Upon completion the Council would then be responsible for all O&M costs.

ii. **Who would carry out O&M?** The Council would own and be responsible for operating and maintaining the Scheme in perpetuity.

iii. **What operational requirements would there be?** The extent of operational requirements depends upon the nature of the design. Operation means any actions the Council would have to take to make the Scheme perform as intended during a flood. This would include deploying any demountable defences, closing any flood gates, and operating any other assets which require human intervention. Operation would also include training staff to operate these assets.

iv. **What maintenance would be required?** The extent of maintenance required depends upon the nature of the design. Maintenance means

any actions the Council would have to take in between floods to ensure the Scheme performed as intended during a flood. This would include periodic inspection of the Scheme's components to check for damage or deterioration which could impact its performance. It would also include periodic testing of any moving parts such as flood gates, demountable defences, or surface water pumps. Any parts that failed inspection or testing would have to be replaced in due course.

v. **How long would the Scheme be designed to last?** The Scheme has an overall intended design life of 100 years. Notwithstanding this, some component parts would still need to be replaced during that time. For example, a bridge would be designed to last 100 years but its bearings could require replacement every 25 years. Similarly, a flood defence wall would be designed to last 100 years but the sealant in its movement joints would still need to be periodically replaced.

c) Since the Council would have to fund O&M and provide staff to undertake this work, the Scheme was designed in such a way to minimise that burden, where reasonably possible. One approach in achieving this is to optimise the use of passive defences that will not require human intervention, while using active defences such as demountable defences and flood gates sparingly, where they would deliver the greatest benefit. Taking this approach to design normally results in a higher construction cost however that is offset by a reduced future maintenance cost. It is recognised, however, that some people would favour an initially less expensive solution which subsequently would have required more intervention and expenditure during its lifetime. As with all design decisions on this complex project there is a balanced decision making required when determining the correct choice of flood risk reduction option at all locations.

d) In summary, the Scheme's O&M requirements were taken into account, and the design was developed so as to make that burden as affordable to the Council as possible, where this was a reasonable outcome within the many decision-making metrics associated with choosing the best option at any given location. In doing so, a balance was achieved between O&M and other design considerations. It is considered that, on balance, the O&M burden over the lifetime of the Scheme is proportionate to the benefit of reduced flood risk.

4.65 **Approach to Seeking Multiple Benefits**

a) It is understood that some objections concerned operations within the Scheme which were not perceived to contribute to reducing flood risk in

Musselburgh. At the outset of the project, the Council established thirty-three project objectives, one of which was, “that where possible, the Scheme will strive to achieve multiple benefits”. In this context, ‘multiple benefits’ refers to working in partnership with other projects or initiatives to leverage greater outcomes than each project might deliver by itself.

b) The potential multiple benefits identified by the project team were the Ash Lagoons Seawall, Musselburgh Active Toun (MAT) project, Traffic Management in Musselburgh, and Fisherrow Harbour & Seafront Association (FH&SA). These specific multiple benefits were first identified to Council’s Cabinet in the report on the Preferred Scheme that was presented in January 2020. A substantive update was then provided in August 2022, which was also when the Ash Lagoons Seawall was formally included in the flood protection scheme such that it could become the flood risk reduction option for the eastern Musselburgh coastline.

c) The inclusion of the works proposed for the seawall within the Scheme and the influence of the MAT project are covered in more detail elsewhere in this report. Meanwhile, multiple benefits associated with traffic management have, so far, not been possible to advance. With regard to Fisherrow Harbour, the harbour walls were identified as a viable flood risk reduction measure for reducing wave overtopping, subject to certain repair works being carried out to maintain its structural capacity. Furthermore, during a process of direct engagement with FH&SA it was confirmed that their preferred approach to delivering flood risk reduction at this location was through the use of the harbour walls. These repairs to the masonry (i.e. the preferred option determined in consultation with FH&SA) were subsequently included in the Scheme.

d) The influence of a multiple benefit on the Scheme is separate and distinct from funding and consenting associated with that multiple benefit. For example, some aspects of the MAT project influenced the design of the Scheme, but notwithstanding this, the MAT project has a separate funding stream and would require its own planning permission. On the other hand, the works proposed for the seawall are primarily a flood risk reduction options and thereby a core part of the Proposed Scheme. In the first example, active travel paths adjacent to the Scheme would not contribute to reducing flood risk, therefore it was determined that they would not be incorporated within the Scheme. Nevertheless, the Scheme was designed in such a way as to not prohibit those paths being delivered in the future. In the second example, the seawall does deliver flood risk reduction and its continued serviceability is essential to the performance of the Scheme. In due course, and assuming all separate projects achieve their own permissions and funding, then along the length of the seawall the Council

would have a holistic design that can deliver the outcome of three separate projects: i.e. the Scheme, the MAT, and the future requirements of Ash Waste retention.

e) In summary, the Council's approach to multiple benefits recognises that where multiple projects have the potential to overlap, it can be advantageous to consider them collectively. This does not absolve each project from obtaining the necessary funding and consents. In some instances, it may be appropriate to combine two projects, while in other instances two projects may simply influence the development of one another. It is considered that all operations within the Scheme as notified in March 2024 are in accordance with the FRM insofar as they either contribute directly to the reduction in Musselburgh's flood risk or are a mitigation measure associated with doing so.

   Finally, it is highlighted by this report that the Scheme is accurately presented in the documents that were published when the Scheme was notified in March 2024. This Proposed Scheme was not the MAT or any other multiple benefit project. Everything that anyone required to understand the Scheme is contained in those documents and those documents alone. The Council has separately confirmed that in due course it will clarify the approach to be taken by the MAT to achieve its delivery in Musselburgh: that is not part of this Scheme Approvals Process under the FRM.

4.66 **Approach to Environmental Impact Assessment**

a) Some people have raised concerns that the Scheme's EIA was conducted by Jacobs, who were also responsible for developing the design. In 2017 the Council conducted a procurement exercise to appoint a design consultant who could provide full consultancy services for the development of the Scheme. The scope of services included: developing the design, conducting the EIA, supporting the Council in obtaining the necessary legal permissions, and supervising the construction phase. Following a competitive tendering process, Jacobs was appointed to provide the services.

b) The EIA is an objective assessment of the impact of the design rather than an independent audit of the designer. There is precedent in Scotland for the consultant on a flood protection scheme to also carry out both the design and the EIA, since the two processes operate in partnership. The designers begin by developing an initial proposal and seek feedback from the EIA specialists on what the environmental impact might be. The EIA specialists then suggest ways in which the design could be altered to

reduce the impact, or mitigation measures that could be implemented where the design cannot reasonably be altered. This is an iterative process which continues until those involved consider that the refined proposal represents the best practicable solution which meets the project's objectives and the Council's needs. The process of assessment and refinement is then recorded in the EIA Report.

c) There are benefits to the Council in having the design and the EIA carried out by one organisation. Whilst the EIA specialists must remain objective in their assessment, they are more likely to have an established relationship with the designers and can work together closely to have a positive influence on the final proposal. This delivers efficiency and adds value for the Council.

d) Consultative bodies such as SEPA, Historic Environment Scotland and NatureScot were extensively consulted during the Scheme's design process. Working groups were established so that the project team could brief the consultative bodies on the emerging design and the reasoning it was based upon. In return, they provided feedback on aspects the designers should consider and ways in which the environmental impact could be reduced or managed. Through this process, the consultative bodies had a positive influence on aspects such as water quality, cultural heritage and biodiversity. Notwithstanding this, the consultative bodies were able to submit representations in respect of the EIA, or even object if they wished, when the Scheme was notified in March 2024.

e) In summary, it is considered that the EIA was conducted in a professional manner by specialists with extensive relevant experience in their respective fields. The EIA Report was an objective assessment of the environmental impact that the Scheme would have. The outline design process brought together the designers, EIA specialists and consultative bodies, and their combined influence is considered to have contributed to the best practicable solution which meets the project's objectives and the Council's needs.

4.67 **Approach to Delivering EIA Mitigation Measures**

a) It is understood that some objections concern how mitigation measures identified within the Scheme's EIA would be enforced. It is recognised that delivering mitigation in full and to an acceptable standard is vital to ensuring flora and fauna are protected where appropriate and significant adverse effects are avoided.

b) For the Scheme to proceed beyond the current stage, it would require to be confirmed in accordance with the FRM. The FRM states that, upon confirmation of the Scheme, "the Scottish Ministers must direct that planning permission… shall be deemed to be granted, subject to such conditions… as may be specified in the direction". As a result, it is anticipated that the EIA mitigation measures will be specified as planning conditions by the Scottish Ministers, which the Council then be legally obliged to discharge.

4.68 **Approach to the Habitat Regulations Assessment (HRA)**

a) Some objections concern the fact that the HRA has not yet been completed and its outcomes published. As set out in the section on impacts to sites designated for nature conservation, the HRA process is ongoing and has been subject to consultation with NatureScot throughout. The HRA process is separate to the Scheme's Environmental Impact Assessment (EIA), although the approach to both should be coordinated. Consequently, whilst the EIA had to be concluded prior to the Scheme's notification under the FRM, the HRA did not. It is understood, however, that the HRA must be complete before the Scheme is confirmed under the FRM Once the HRA is complete, the Council will consider how best to publish its associated outcomes.

4.69 **Approach to Fourth National Planning Framework (Ensuring Positive Effects for Biodiversity)**

a) It is acknowledged that the Scheme is required to align with the policies set out in 'National Planning Framework 4' (NPF4). Some objections relate to whether the Scheme would deliver the required positive effects for biodiversity. NPF4 requires that "Development proposals … contribute to the enhancement of biodiversity, including where relevant, restoring degraded habitats and building and strengthening nature networks and the connections between them. Proposals should also integrate nature-based solutions, where possible (Policy 3)".

b) Biodiversity enhancement measures have been adopted within the Scheme. Some of the key measures committed to include:

i. The provision of improved replacement habitats and additional habitat creation;

ii. Implementation of a Landscape and Habitat Management Plan during the detailed design phase, which will include the development of a mixture of natural regeneration of riparian (riverbank) vegetation as well as planted woodland, wetland, grassland, low shrubs and scrub

cover using native species selected to support biodiversity and maintain wildlife corridors; and

iii. Other measures aimed at supporting certain species such as bees, bats or birds, are also proposed.

c) It is considered that once replacement planting becomes established, the Scheme will have a long-term positive effect on biodiversity.

4.70 **Approach to Equality Impact Assessment**

a) Some objections concern the approach taken by the Council in respect of Equality Impact Assessment. The Equality Act 2010 places duties on Scottish public bodies to protect people from discrimination. Equality Impact Assessments provide a means of assessing the potential impact that policies or projects might have on equality, particularly those with protected characteristics.

b) At a strategic policy level, an equality impact assessment forms part of the report whenever recommendations are presented to the Council's elected members for a decision. This enables the members to consider the impact that their decision might have on the community. Specific examples of this on the project include decisions taken with regard to standard of protection, allowance for climate change, and approach to Natural Flood Management. These decisions subsequently influenced the scale, form, position and general appearance of the Scheme's components.

c) It is anticipated that at the detailed design phase of the Scheme, further Equality Impact Assessments would be conducted in relation to specific aspects of the design. These might include the choice of materials, dimensions of the Scheme components, and how users interact with those components.

4.71 **Approach to Locations of Site Compounds**

a) The proposed components of the Scheme's construction would be dispersed across the town. For this Scheme the defences and thereby their construction site are mostly linear and running along the sides of the River Esk or along the foreshore of the Firth of Forth. It is understood that a number of site compounds will be required at different times and in different locations during the construction phase.

b) Generally, it is necessary to have a site compound as part of each working area. These are used to provide welfare facilities for workers and a safe

area for delivery of construction materials. The size of any given site compound is therefore proportionate to the size of the working area and the form of construction in that location. Materials are often kept off-site until needed, which helps to minimise the area required.

c) A specific concern of this theme is in relation to the use of Fisherrow Links as a site compound. It is recognised that Fisherrow links is a valued amenity asset to the community, and some people have raised concern about its use as a site compound to facilitate the construction of the Scheme. Fisherrow links is in the order of 70,000m^2 in area, whereas even a large site compound might only be in the order of 7,000m^2. During consultation events in 2020 the project team raised the concept of using a small part of the links so as to gauge public opinion on the matter. While it was clear that using a large part of the links would be opposed, it was also identified that parts of the links where periodically occupied for other purposes, such as the circus, and that this was not opposed by the community.

d) It is anticipated that any site compounds required to construct the Scheme would be capable of being located within the limited of land identified on the published Scheme's Operations Drawings. As such, the vast majority of Fisherrow Links is not anticipated to be affected by the Scheme.

5 REPORT INFORMATION

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