WEYMOUTH FCRM SCHEME

STRATEGIC OUTLINE CASE

Recommendation

This Strategic Outline Case (SOC) submission is recommended for assurance and approval to enable detailed appraisal and outline design of a comprehensive flood and coastal risk management (FCRM) scheme for Weymouth in Dorset.

Initial project approval of £1,600k is sought to enable lead-in activities pursuant to the submission of an Outline Business Case (OBC). It is anticipated that this will be expended over 3 years from 2021 to 2023 and be funded by Dorset Council.

Funding and implementation of all phases of the Weymouth scheme over the next 100 years is estimated to be approximately £52m Present Value (PV), which will provide substantial flood and coast risk benefit estimated to be £470m PV with a Benefit Cost Ratio of approximately 9 : 1.

It is anticipated that the delivery of this much needed scheme will also be a catalyst for regeneration and public realm enhancement, the combined benefits of which will significantly improve the lives and wellbeing of people residing, working and visiting Weymouth. This regeneration will unlock third party funding and reduce the burden on the taxpayer.

Without adequate plans and strategies to adapt to flood and coastal risk, for which this proposed scheme is a major component, future development will be severely constrained.

Based on available information it is understood that over 1,000 properties are at coastal flood risk (‘moderate’ and ‘intermediate’) in the present day, rising to over 1,400 (mostly ‘very significant’) properties by 2120 as a consequence of climate change. The data quality score and robustness of the affected properties requires refinement and improvement through the development of this scheme.

Version Control

V5.0 | FIFTH ISSUE - FINAL | July 2021

Version History

V4.0 | FOURTH ISSUE (FINAL) | June 2021

V3.0 | THIRD DRAFT (FINAL) | May 2021

V2.0 | SECOND DRAFT (For Comment) | May 2021

V1.0 | FIRST DRAFT (For Comment) | Mar 2021

Assurance and Approval Record

RMA reference number: SCH3241

Environment Agency reference number: xxxxx

Date of submission to Environment Agency: xx/xx/xx

Assurance from Risk Management Authority

I confirm that this Strategic Outline Case meets our guidelines, quality assurance requirements, environmental obligations and Defra investment appraisal conditions. All internal approvals, including member approval, have been completed.

Name of RMA Project Executive: **Sarah Cairns | Service Manager for Major Projects, Dorset Council**

Approval from Risk Management Authority Council

Version approved: v5.0

Date: 22/06/21

Endorsement from Environment Agency Area Flood and Coastal Risk Manager

I confirm that the Strategic Outline Case is ready for assurance.

Applications less than £1million - I have consulted with the Area Director and Senior Finance Business Partner External Funding & Grants.

Applications up to £10million - I have consulted with the Director of Operations and the Deputy Director of Finance.

Applications up to £20million - I have consulted with the Executive Director of Operations and the Director of Finance.

Applications over £20million - I have consulted with the Executive Director of Operations, the Executive Director of FCRM and the Director of Finance.

Name of Area Flood and Coastal Risk Manager: Ron Curtis

Date: xx/xx/xx

[For administrative use only]

Environment Agency Assurance and Technical Approval

I recommend that the application is granted technical approval

Name of AFCRM or Lead Assurance Reviewer:

Date:

[For administrative use only]

Financial Approval

[See Section A4 of the Financial Scheme of Delegation.]

Name of Approving Officer:

Date:

Name of Approving Officer:

Date:

Name of Approving Officer:

Date:

FSoD reference:

Date:

Financial Scheme of Delegation Co-ordinator

Notes

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Contents

1.0 Project Assurance Summary

This Strategic Outline Case (SOC) submission promotes a comprehensive flood and coastal risk management (FCRM) scheme for Weymouth in Dorset, referred to hereafter as the 'FCRM scheme'.

The SOC seeks assurance and approval to enable lead-in activities to progress scheme development pursuant to the submission of an Outline Business Case (OBC) for the FCRM scheme.

The SOC had been produced in accordance with The Green Book: Central Government Guidance on Appraisal and Evaluation (HM Treasury, 2020) and Flood and Coastal Erosion Risk Management Appraisal Guidance (Environment Agency, 2010) principles.

This is an excellent opportunity to enhance the waterside environment of Weymouth by creating a more resilient and sustainable town that can meet the future needs of its residents, businesses and visitors. It is anticipated that third party contributions will be available due to the regenerative aspects of the project.

Anticipated Overall Value of FCRM Scheme £113m (100yr Cash Cost) £52m (100 yr PV)

Assurance Value of Project (next stage) £1,600k (Dorset Council funding)

Flood risk type: Fluvial / Coastal (tidal inundation and wave overtopping) / Pluvial/Surface Water / Groundwater

Erosion: Coastal erosion / Weymouth Harbour quay wall collapse

Numbers of households at flood and/or erosion risk?

Table 1: Overview of current day and future households at risk (Note: The households at risk profile appears stark but is reflective that just a small increase in water level results in a large proportion of the town affected.)

Household Risk Category	Current day scenario (2020)	Future scenario (2120)
Very Significant Risk[1]	0	1,369
Significant[2]	0	29
Intermediate[3]	985	35
Moderate[4]	51	19

[1] Greater than or equal to 5% AEP. ≥5% AEP (standard of protection less than or equal to 1 in 20)
[2] Less than 5% AEP but greater than 2% AEP. 2% AEP (standard of protection 1 in 21 to 1:49)
[3] From 2% AEP but greater than 1% AEP. 2% to >1% AEP (standard of protection 1 in 50 to 1 in 99)
[4] From 1% AEP but greater than 0.5% AEP. 1% AEP to >0.5% AEP (standard of protection 1 in 100 to 1 in 199)

Critical Infrastructure at risk now and in future?

- A354 Highway (Westwey Road) (Main trunk road link to Portland).
- B3155 Highway (Swannery Bridge/ King Street).
- Network Rail Weymouth Railway Station.
- Wessex Water Pumping Station.
- RNLI Weymouth Lifeboat Station.
- Power distribution substation and associated infrastructure.
- Numerous 'More Vulnerable' classification (under National Planning Policy Framework) sites, for example; care homes, health services, social services provisions etc.

Type, condition and residual life of existing defences?

Existing limited Environment Agency defences with most recent flood protection scheme constructed in 2001/2002 to a crest level of 2.30mOD. Present day (2020) 0.5% AEP extreme still water (sea) flood level is 2.43mOD (refer to Section 2.4.2 for further information on sea level risk and climate change projections). The Environment Agency assets are raised flood walls (AIMS condition grade fair or good) but are built upon existing quay/ harbour walls with current AIMS condition grade of poor and very poor. The existing walls and defences do not provide complete cut-off and localised flooding has been known to occur due to seepage and surface water problems.

Environmental designations?

See Section 2.3 for detailed environmental consideration. Designations of significance are summarised below.

- Proximal to Radipole Lake Site of Special Scientific Interest (SSSI), Lodmoor SSSI and Portland Harbour Shore SSSI. Anticipated need for SSSI assent to enable implementation.
- Isle of Portland to Studland Cliffs Special Area of Conservation (SAC) is outside of the scheme area and is deemed unlikely to require a Habitats Regulation Assessment.
- United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site (Dorset and East Devon Coast) Reference:1000101; Old Reference: 13.
- Multiple Grade I, II and II* Listed Buildings.
- Scheduled Monuments (Nothe Fort, tramway and searchlight battery at The Nothe) Old Reference: 33199; Reference: 1020063.
- National Trail/ Coastal Path and Public Rights of Way.

How is flood and erosion risk managed?

Currently managed by Dorset Council as: Lead Local Flood Authority (LLFA), Local Planning Authority (LPA), Coast Protection Authority (CPA), Harbour Authority and principal asset owner of Weymouth Harbour, managed Weymouth Beach, Esplanade and Radipole Lake infrastructure.

The Environment Agency have a number of existing flood defence assets, along with their Main River (River Wey) and coastal overview responsibilities including operation and management of the beach frontage and flood defence assets at Preston Beach.

Wessex Water (as the local water company) are a defined Risk Management Authority and have a responsibility for managing risk of flooding via the water and sewage network.

Summarise the case for change?

Weymouth already floods and is impacted by coastal erosion. With a robust prediction of an acceleration in sea level rise and more intense weather events as a result of climate change, the dual problems of flood risk and loss of beach facing Weymouth will increase significantly. Without investment in managing this flood and erosion risk, Weymouth faces increasing direct losses through flooded and eroded assets and infrastructure, with further indirect impacts such as a failing property market due to blight and increasing social deprivation. Weymouth is at risk from tidal flooding, wave overtopping, coastal erosion, fluvial flooding and surface water flooding. Investment now will afford the town time to adapt to this changing climate.

The FCRM scheme will seek to address all sources of flood risk to ensure a strategic approach to management. This will prevent any ‘double-counting’ of benefits and allow the appropriate claiming of Outcome Measure 2 (OM2) households.

Selected option?

Options are to be developed through comprehensive appraisal as part of the OBC process.

At this stage, Dorset Council have an agreed strategic adaptive pathway which does not foreclose future options or unnecessarily constrain future choice, which forms part of the internally approved (and supported by Environment Agency Wessex Area Team) Weymouth Harbour & Esplanade FCRM Strategy (Dorset Council, 2020c). The pathway currently identifies phased approaches to wall raising, wall replacements, continued beach management and the possible future inclusion of a tidal barrier. (See Section 3 Economic Case, Figure 9 and Appendix F for more detail)

Economic cost and benefit of overall scheme (100yr Appraisal Period)

All values are approximate.

- Present Value Benefit - £470m**.**
- Present Value Cost - £52m (Note: The PVc appears low as future phases are significantly discounted).
- Net Present Value - £420m.
- Benefit to Cost Ratio – 9 : 1.
- Whole Life Cash Cost - £113m.

Affordability of selected option

- Raw Partnership Funding (50yr Duration of Benefit) score is 79%.
- Adjusted Partnership Funding (50yr DoB) score is 100%.
- PV Funding (50yr DoB) from Environment Agency (grant) is £ TBC c.£31m.
- PV Funding (50yr DoB) from the Regional Flood and Coastal Committee is £ TBC c.£0.84m.
- PV Funding (50yr DoB) from Dorset Council is £ TBC c.£7.4m.

Risk allowance.

- The total contingency amount is £40m (100yr Cash Cost).

Top three residual risks.

- Buildability and constructability.
- Benefits and cost certainty and funding gap (in particular from low modelling confidence).
- FCRM scheme endorsement (regulatory / statutory and third party interested parties).

Permissions and consents

- All consents & permissions to be secured post SOC assurance.

Outcomes

- OM2 – Anticipated to be c. 1,036 properties.
- OM2b – Anticipated to be c. 72 properties.
- OM3 – Anticipated to be c. 166 properties. (Through delivery of SMP2 Policy).

Schedule of critical milestone dates

Table 2: Schedule of critical milestone dates

Activity	Date
Strategic Outline Case – Submit to LPRG	July 2021
Strategic Outline Case – Approval	September 2021
Outline Business Case development	2021 – 2023
Outline Business Case – Submit to LPRG	March 2023
Outline Business Case – Approval	April 2023
Detailed Design & Consents	Spring 2023 – Summer 2024
Construction Start – Initial Phases	Autumn 2024
Construction End – Initial Phases	2040

Strategic Case

Why is a scheme needed and what is the strategic fit?

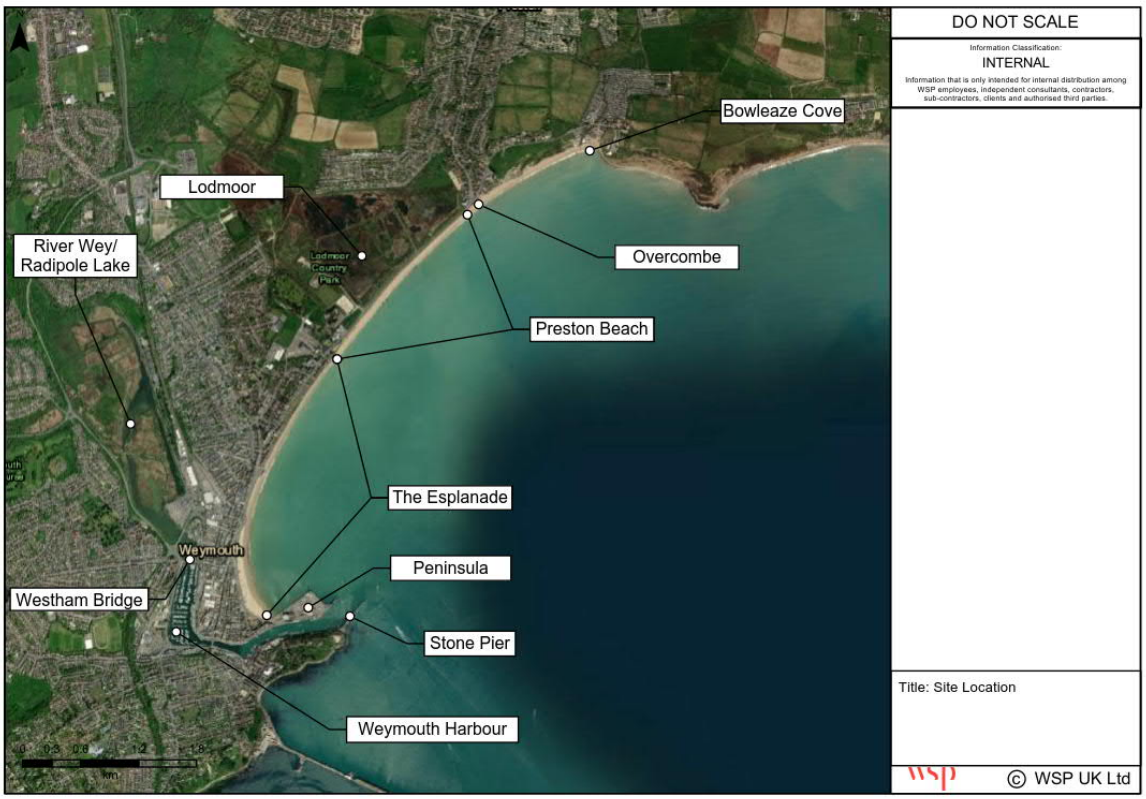
2.0 Strategic Case

2.1 Introduction

Weymouth is a coastal town located on the south coast of England, at the mouth of the River Wey (Figure 1), known for its popular beach frontage and wide promenade along Weymouth Esplanade. It has an estimated population of just over 50,000 (2018 census estimates). The main commercial town centre is bounded on three sides by water; the River Wey (Main River), the Weymouth Harbour and the Weymouth Bay/ Seafront.

The Preston Beach and Lodmoor frontage to the north is an EA maintained coastal defence. As such it is excluded from the extents of this FCRM scheme which focuses on the main populous areas of Weymouth. Interaction between the cells will be further explored and refined in the next stages of FCRM scheme development.

Figure 1: Site Location



The town has grown and thrived on its connection to water and the sea, with Weymouth and Portland considered as some of the best sailing waters in the world, making it the sailing venue for the London 2012 sailing events. However, people and property face an increasing risk of flooding and erosion. As with many towns located at the confluence of a river and the sea, Weymouth is low lying and has experienced

many flood and erosion events in its past. Climate change is causing an increase in flood risk due to sea level rise and increased storm event frequency and severity which is likely to see more flooding affecting Weymouth into the future without intervention. There is a very clear 'cliff-edge' of numerous commercial and residential properties entering the significant flooding category in around 10 to 15 years.

It is becoming progressively more difficult to enable and promote development within the town under the current circumstance due to the current and future risk of flooding and associated acceptability of development from a planning perspective. It is anticipated that the scheme interventions can be integrated with public space and placemaking initiatives, in turn increasing business confidence and be a catalyst for positive regeneration.

2.2 Strategic context

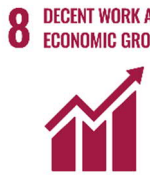
The FCRM scheme is consistent and is aligned with all relevant strategy and policy, the most notable of which are summarised below.

2.2.1 Global

United Nations Sustainable Development Goals (UN SDG) (United Nations, 2015)

Several of the UN SDG's are relevant to the development of this scheme as summarised in Table 3.

Table 3: Relevant UN SDGs

	**Goal 8** – Decent work and economic growth. The scheme can bring economic growth and regeneration to Weymouth town centre and the surrounding communities.
	**Goal 9** – Industry, Innovation & Infrastructure. The scheme is required to ensure Weymouth is resilient and has modern-day infrastructure that is adaptive and efficient in response to a changing climate.
	**Goal 11** – Sustainable cities and communities. The scheme will provide resilience to cultural heritage, reduce the impacts to people affected by natural disasters (flooding and erosion) and offer access to safe and improved public spaces.

	**Goal 13** – Climate action. The scheme will strengthen Weymouth's resilience and its ability to adapt to future climate change challenges.
	**Goal 14** – Life below water. The scheme will seek to improve water quality through reducing the impacts of sewer flooding.

2.2.2 National

A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018)

One of the six primary goals outlined in the plan is to reduce the risk of harm from floods and other environmental hazards with strong response and capabilities by:

- Making sure everyone is able to access the information they need to assess any risks to their lives and livelihoods, health and prosperity posed by flooding and coastal erosion.
- Bringing the public, private and third sectors together to work with communities and individuals to reduce the risk of harm.
- Making sure that decisions on land use, including development, reflect the level of current and future flood risk.
- Ensuring interruptions to water supplies are minimised during prolonged dry weather and drought.
- Boosting the long-term resilience of our homes, businesses and infrastructure.

National FCRM Strategy for England (Environment Agency, 2020b)

The National FCRM strategy has been split into three high level core ambitions concerning future risk and investment need.

- Climate resilient places: working with partners to bolster resilience to flooding and coastal change across the nation, both now and in the face of climate change.
- Today's growth and infrastructure resilient to tomorrow's climate; Making the right investment and planning decisions to secure sustainable growth and environmental improvements, as well as resilient infrastructure.
- A nation ready to respond and adapt to flooding and coastal change.

Climate Change Act 2008 (HM Government, 2008)

The Climate Change Act 2008 commits the UK Government to reduce carbon emissions to net zero by 2050. Dorset Council declared a Climate and Ecological Emergency in July 2020 (Dorset Council, 2020a), publishing a strategy and action plan to become carbon-neutral by 2040 and increasing climate resilience.

2.2.3 FCRM

Multiple reports relating to flooding and coastal erosion risks have been commissioned and/or undertaken by the former Weymouth & Portland Borough Council, Dorset Council and wider partners including the Environment Agency. The most relevant to this scheme are listed chronologically below.

- Weymouth Flood Risk Management Strategy (Environment Agency, 2010).
- Shoreline Management Plan Review (SMP2) Durlston Head to Rame Head (Halcrow, 2011) (adopted Weymouth & Portland Borough Council & Environment Agency) (Pertinent Policy Unit 5g16 Preston Beach to Weymouth – 'Hold the Line': Short, Medium and Long term epochs).
- South West River Basin District River Basin Management Plan (Environment Agency, 2015b).
- Weymouth Bay Coastal Processes Study (JacksonHyder, 2018).
- Weymouth Harbour & Esplanade Flood & Coastal Risk Management Strategy Update (WSP UK Ltd, 2019).
- Weymouth Beach Management Plan (Jacobs, 2019).
- Weymouth Harbour & Esplanade FCRM Strategy (Dorset Council, 2020c).

2.2.4 Spatial Planning & Development

The National Planning Policy Framework (Ministry of Housing, Communities & Local Government, 2019) sets out the Government's planning policies for England. Those policies ensure that inappropriate development in areas of flood risk are avoided and requires the use of the sequential and exception test to direct development to areas at low risk of flooding prior to consideration of development in medium to high risk areas.

At a local level, development objectives are set out in the following documents.

- West Dorset, Weymouth & Portland Local Plan (Weymouth & Portland Borough Council, 2015a).

It should be noted that the new Dorset Council Local Plan is currently being developed with the Local Plan options consultation held in January 2021. It is expected that the new Dorset Council Local Plan will include policies relating to future FCRM needs around Weymouth. This will protect areas of land needed to enable future FCRM

measures to be implemented which can incorporate a potential future tidal barrier to be constructed and operated.

- Weymouth Town Centre Masterplan (Weymouth & Portland Borough Council, 2015c).
- Weymouth Town Centre Masterplan: Supplementary Planning Document (Weymouth & Portland Borough Council, 2015b).
- Weymouth Strategic Flood Risk Assessment Level 2 (Weymouth & Portland Borough Council, 2009). (A new SFRA Level 2 is expected to be produced in the near future to support both a new Dorset Local Plan and an anticipated new Local Flood Risk Management Strategy).

2.2.5 Coastal

The coast of Dorset is of national and international importance. As such the following coastal plans, polices and strategies are of relevance to this scheme:

- South Inshore and Offshore Marine Plan (HM Government, 2018).
- Jurassic Coast Partnership Plan 2020-2025, Management Framework for the Dorset and East Devon Coast World Heritage Site (Jurassic Coast Trust, 2020).
- The Dorset Coast Strategy (Dorset Coast Forum, 2011).
- Dorset Harbours Strategy 2021 – currently in consultation.
- Weymouth Beach Management Plan (Jacobs, 2019)

2.2.6 Corporate

The scheme has the support of local government and is aligned with and will support the delivery of the current corporate plans.

- Dorset Council's Plan | 2020 to 2024 (Dorset Council, 2020b).
    - Relevant priorities; Economic Growth, Unique Environment, Strong & Healthy Communities.
- Wessex Regional Flood & Coastal Committee (RFCC) – 'Priority location' (identified within current committee strategy).

2.3 Environmental and other considerations

Work to understand the existing environmental baseline, constraints, opportunities and initial scheme environmental appraisal was undertaken to support earlier studies. It has been previously presented as a Preliminary Environmental Information Report (PEIR) (JacksonHyder, 2018). It was supported by an Indicative Landscape Plan (ILP) in line with Environment Agency best practice.

To enable the PEIR process, consultation with key stakeholders was undertaken including; Natural England, Marine Management Organisation, Environment Agency, World Heritage Site Team and Dorset Council Natural Environment Team.

2.3.1 Environmental Impact Assessment

Environmental Impact Assessment (EIA) Screening was undertaken for the construction and operational activities of a proposed FCRM scheme as it was previously understood in 2015. The proposed scheme could be considered to fall under Paragraph 10 (m) of Schedule 2 of Town & Country Planning (Environmental Impact Assessment) Regulations 2017 and Paragraph 69 of Schedule A2 of the Marine Works (Environmental Impact Assessment) Regulations 2007:

'Coastal work to combat erosion and maritime works capable of altering the coast through the construction of, for example, dykes, moles, jetties and other sea defences, excluding the maintenance and reconstruction of such works.'

An EIA Screening and Scoping opinion was requested from Weymouth and Portland Borough Council in their capacity as the Local Planning Authority pre Local Government Reorganisation (now Dorset Council).

Pertinent topics arising from review of the environmental baseline conditions and consideration of potential options include:

- ecology,
- cultural heritage, and
- landscape/townscape.

Following engagement with the Local Planning Authority through screening and scoping opinion, topics requested to be scoped back into the EIA at the request of the LPA include:

- human environment,
- hydrology and flood risk,
- geology, hydrogeology, soils & contaminated land,
- traffic & transport, and
- water quality & climatic factors.

Further terrestrial and marine EIA Screening and Scoping will be undertaken as part of the next stage (OBC) of the FCRM scheme development in accordance with the Town & Country Planning (Environmental Impact Assessment) Regulations 2017 and Marine Works (Environmental Impact Assessment) Regulations 2007.

2.3.2 Habitats Regulation Assessment

Consideration of any works which may have effects on protected features of habitats under the Conservation of Habitats and Species Regulations 2017 require Habitat Regulation Assessment (HRA).

The nearest designated location is Isle of Portland to Studland Cliffs Special Area of Conservation (SAC).

It is considered unlikely that the proposed scheme has the potential for any effects on the selected qualifying features and the conservation objectives of the conservation area.

The PEIR (JacksonHyder, 2018) identified no requirement to undertake HRA, however this will be further reviewed as part of the next stage (OBC) of the FCRM scheme development as the proposed option development progresses.

2.3.3 Site of Special Scientific Interest (SSSI) Assent

The scheme area of interest is proximal to Radipole Lake SSSI, Lodmoor SSSI (both currently managed by the Royal Society for the Protection of Birds (RSPB) under existing Water Level Management Plan's) and in part within Portland Harbour Shore SSSI. As such, 'assent' from Natural England is likely to be required.

Natural England, through previous earlier consultation, have stated that they do not anticipate direct significant ecological impacts with scheme proposals and as such have no major concerns, however this will be further reviewed as part of the next stage (OBC) of the FCRM scheme development as the proposed option development progresses.

2.3.4 Water Framework Directive (WFD)

All scheme activities and proposals will need to comply with the requirements of the South West River Basin Management Plan, and a WFD assessment will be required.

The Coastal Water Body within which Weymouth Bay is located, is defined as "heavily modified" in terms of its hydro-morphological status and has a "good" overall ecological status (JacksonHyder, 2018).

The River Wey Water Body and Wey Transitional Water Body are both ranked 'moderate' in their overall classification as per the second cycle of river basin planning.

A preliminary WFD assessment was completed as part of the PEIR for the Weymouth Bay Coastal Processes Study (JacksonHyder, 2018). The assessment concluded that, subject to the adoption of best practice in respect to pollution control and construction, the scheme would not inhibit the achievement of the WFD objectives of the water body.

However, it is considered appropriate that a further ‘detailed’ assessment and associated works are likely once the scheme options are further refined in the next stages of the FCRM scheme.

2.3.5 Landscape & Cultural Heritage

The built heritage of Weymouth is clearly defined by its geography, geology and the landscape it has created in its peninsula relationship with the sea. This provides a strong sense of place with local distinctiveness, attractive to both residents and visitors alike.

The FCRM scheme is located within Weymouth Town Centre Conservation Area (designated in 1974) and includes over 600 Listed Buildings (consisting a mix of Grade I, II and II*). In addition, to the south of Weymouth Harbour is the Nothe Fort, a Scheduled Ancient Monument.

The development of the FCRM scheme options is likely to bring direct impact on the townscape character, which in certain locations may be sensitive to change. However, FCRM scheme options may also provide opportunity to enhance the public realm thus improving the amenity value of the local area and protect these historic and cultural heritage assets.

The South West Coast Path and the English Coast Path – both of which are National Trails run through the FCRM scheme area which presents an opportunity to make positive improvements to the National Trails network.

Further assessment of these topics will support the next stages of the FCRM scheme through the OBC process. It is recognised that scheme development within such a highly designated heritage environment will require significant consideration.

2.3.6 Navigation

Weymouth Harbour is an active port for commercial shipping, fishing, and recreational boating and personal watercraft with an existing RNLI Lifeboat Station. The ‘conservancy’ of Weymouth Harbour and the ability to continue to safely navigate into and out of Weymouth Harbour must be given appropriate consideration in the development of FCRM scheme options.

2.3.7 Harbour Revision Order / Transport and Works Act Order

Dependent upon the final options choices, the consideration of a longer term tidal barrier may require either the securing of a Harbour Revision Order (HRO) or a Transport and Works Act Order (TWAO). Such consents are unlikely to be required for delivery of the first phases of the FCRM scheme. However, this should be reviewed at OBC stage to confirm if there are any impediments likely to occur in relation to obtaining any such consent to demonstrate feasibility of the FCRM scheme options, most notably a tidal barrier later in the benefits period.

This matter has been reviewed at a high level as part of the Weymouth Tidal Barrier – Tidal Barrier Advice Report (Jacobs, 2021) which is included in Appendix F.2.4 The case for change.

2.4.1 Case for change introduction

Weymouth already floods and is impacted by coastal erosion, a number of examples of past flooding and wave overtopping events are presented in Figure 3 to Figure 7. With a robust prediction of an acceleration in sea level rise and more intense weather events as a result of climate change, the problems facing Weymouth will increase significantly. The dominant flood risk source, given climate change is from tidal inundation.

Without investment in managing flood and coastal erosion risk, Weymouth faces increasing direct losses through flooded assets and infrastructure and indirect impacts such as a failing property market due to blight and increasing social deprivation. The impact of increasing flood depths and increasing frequency of flood occurrence will have significant adverse impact to people, for example through negative health and wellbeing effects.

The case for the FCRM scheme aligns with all strategies set out in the numerous documents addressing the management of flood and coastal risk; of which more detail is provided in Section 2.2.

Figure 2 shows the Environment Agency Flood Map for Planning centred on Weymouth town at a scale of 1:10,000. This illustrates the published flood zones and the Environment Agency's Main River designation of the River Wey.

Figure 2: Extract of Flood Map for Planning (Environment Agency, 2021b)

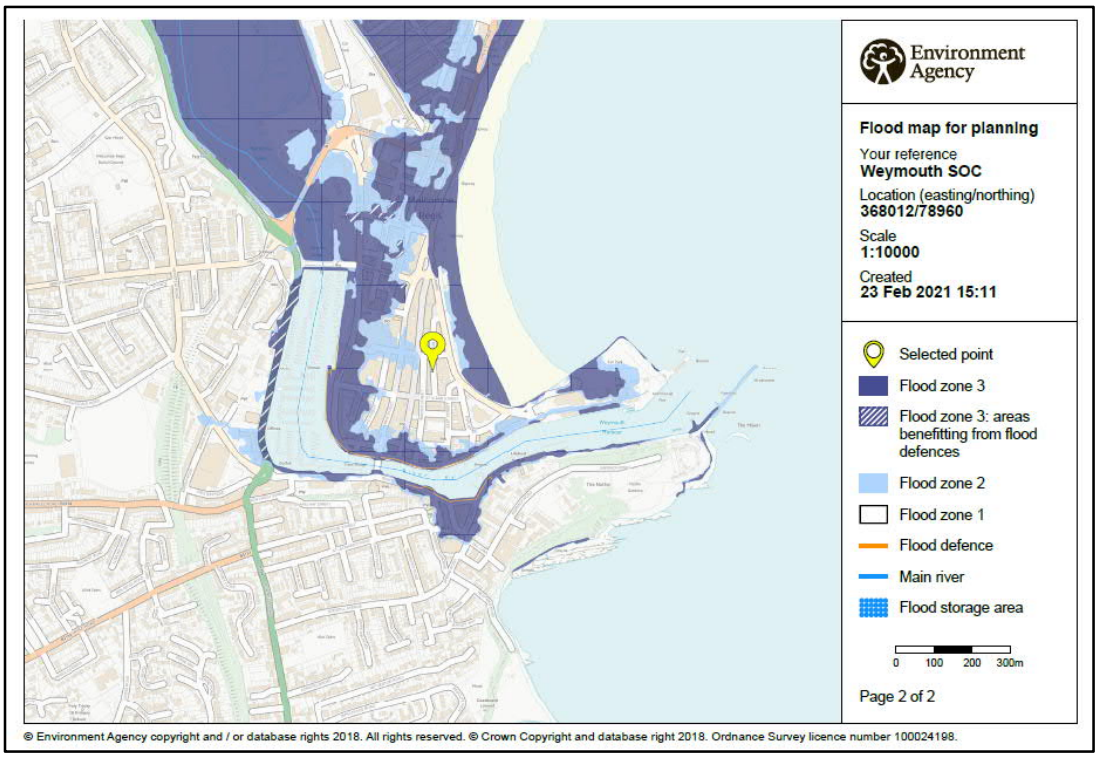


Figure 3 Weymouth Esplanade – Wave overtopping in storm conditions (Date unknown pre-2015) (Photo credit Dorset Echo)

Figure 4 Weymouth Esplanade, Surface Water Flooding – 2010 (Photo credit – Dorset Echo)

Figure 5 Weymouth Harbourside, Commercial Road – Tidal flooding, September 2019 (Photo credit James Moules, Dorset Echo)

Figure 6 Weymouth Harbour, Custom House Quay Tidal Flooding, March 2020 (Photo credit James Birch, Dorset Echo)

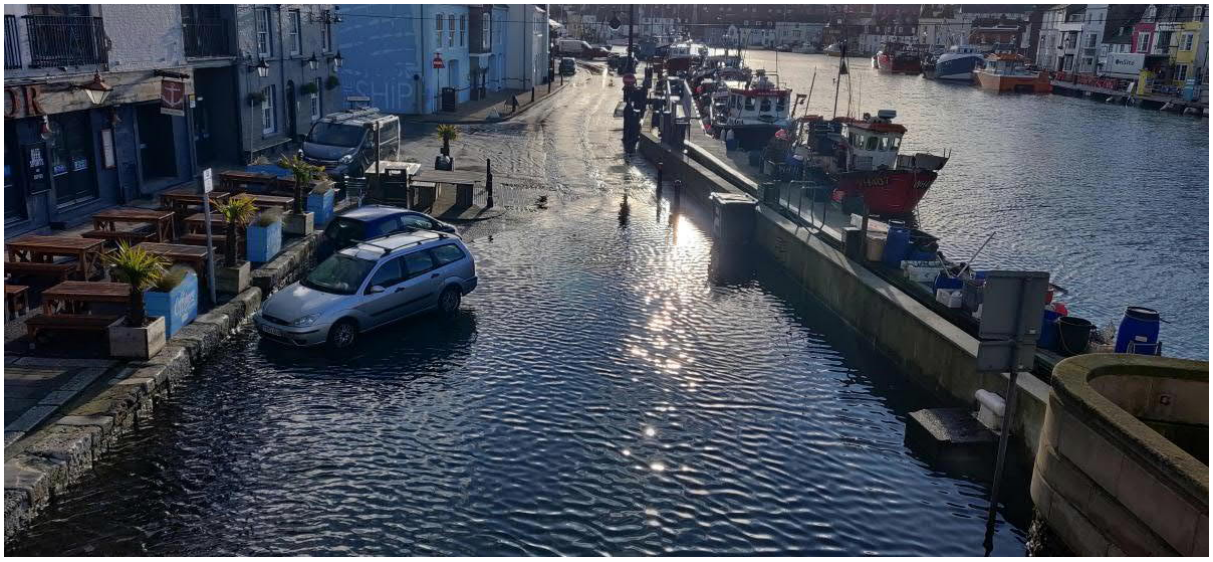


Figure 7 Weymouth Radipole combined tidal/fluvial flooding, 2012 (Photo credit Environment Agency)

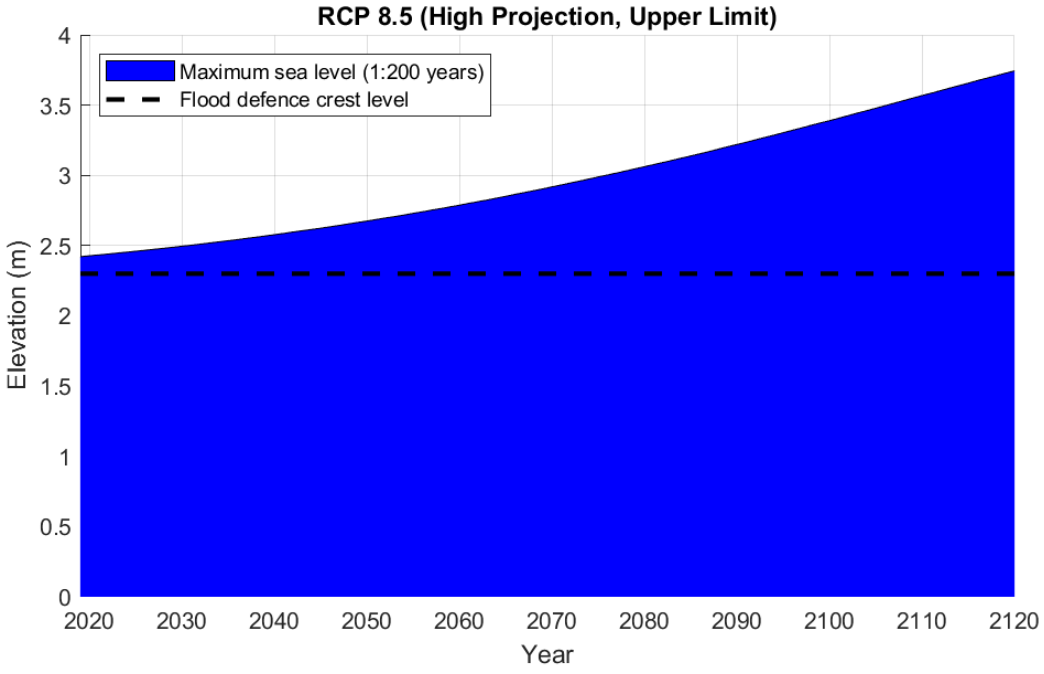
2.4.2 Sea level rise and climate change projections

Coastal management schemes must account for accelerated sea level rise caused by climate change. In accordance with the National Planning Policy Framework (Ministry of Housing, Communities & Local Government, 2019), Flood Risk and Coastal Change

Planning Practice Guidance (Ministry of Housing, Communities & Local Government, 2014) and Flood and Coastal Risk Projects, Schemes and Strategies: Climate Change Allowances (Environment Agency, 2020a), climate change should be informed by the latest climate change projections, which currently references the UK Climate Predictions 2018 (UKCP18) project released in November 2018 (Met Office, 2018). The UKCP18 project was undertaken by the Met Office and funded by Defra, with the purpose of reviewing and updating climate change projections for the UK. Figure 8 shows how sea level rise is expected to affect high water levels in Weymouth in comparison to the current +2.30m Ordnance Datum Newlyn (ODN) crest level over the next 100 years.

The target Standard of Protection (SoP) against coastal flooding at Weymouth is 1 in 200 years (0.5% annual exceedance probability – AEP), where extreme sea levels are based on the Coastal Flood Boundary Extreme Sea Levels (Environment Agency, 2018) [Node_4736] which are values for still water sea levels only and do not account for any localised increase in sea level that may be induced by onshore wave action, orientation or topography.

Figure 8: Projected rise in the predicted 1 in 200-year return period extreme tidal still water level at Weymouth up to 2120 under the UKCP18 'High' emissions projection (WSP UK Ltd, 2019)



Over this 100 year time period, the 1 in 200-year return period predicted extreme tidal water level can be seen to increase from a present-day (2020) level of +2.43m ODN to a level of +3.74mODN in 2120. This equates to a sea level rise of 1.3m over the next 100 years based on the UKCP18 projections and 'High' emissions scenario (Representative Concentration Pathways (RCP) 8.5, 95th Percentile). The current typical defence level is +2.30mOD around Weymouth Harbour and between +3.00mOD and +3.50mOD along the esplanade frontage. The esplanade requires a

more significant crest height than that of the harbour as it defends against both still water levels and wave action.

2.4.3 Existing tidal flood defences

The most recent flood protection scheme constructed in Weymouth Harbour was that built in 2001/2002 by the Environment Agency. It was designed to a 1 in 200-year Standard of Protection (0.5% AEP) (without allowance for freeboard) which at that time required a crest level of +2.30mODN. This was the best standard of protection that was deliverable at that time.

The wall heights around Weymouth Harbour vary with some higher and lower than the 2001/2002 Environment Agency scheme level of +2.30mODN. There are multiple construction forms and types of wall assets built over centuries and are accordingly in variable condition. Corresponding residual asset life for wall sections range from less than a year up to greater than 60 years (JBA Consulting, 2019a) & (JBA Consulting, 2019b). However, even walls with reasonable residual life may require raising or replacement in order to achieve the required crest level to afford flood risk protection.

2.4.4 Properties at flood risk

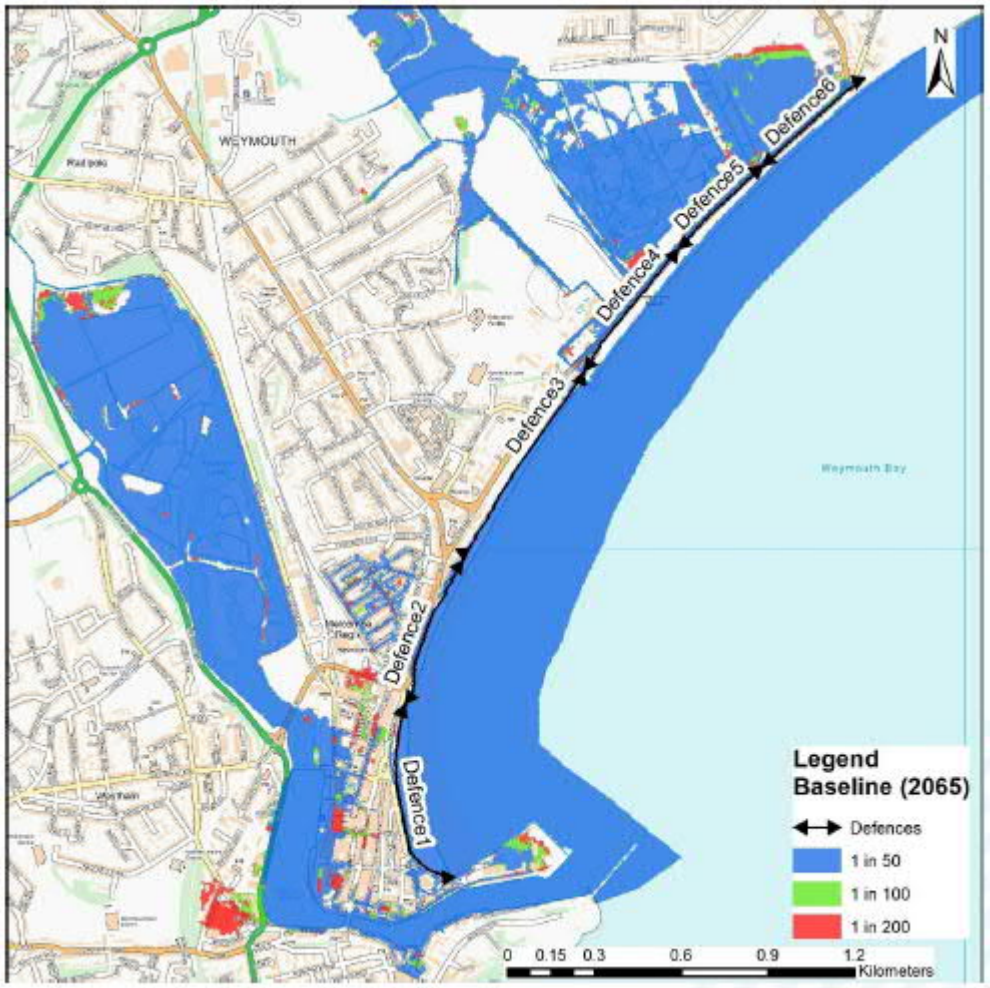
Various technical reports (which include computer flood modelling simulations) have estimated the number of residential and non-residential properties around Weymouth Harbour and behind the esplanade to be at risk of flooding if a 1 in 200-year return period (0.5% Annual Exceedance Probability (AEP)) tidal flood event occurred. The flood risk mechanism could be one of, or a combination of, extreme still water level, wave overtopping, fluvial or surface water flooding. In addition, the flood risk impacts from any failure of individual sections of Weymouth Harbour quay walls have been analysed.

The Weymouth Bay Coastal Processes Study (JacksonHyder, 2018) undertook modelling utilising TUFLOW software and calculated wave overtop volumes using empirical equations from the European Overtopping Manual (EurOtop). This was further developed through the Weymouth Inundation Modelling Report (JBA Consulting, 2019c). In this piece of work, the existing TUFLOW model was updated using EurOtop Neural Network calculation methods to derive wave overtopping volumes. In addition, scenarios of erosion beach loss were considered to review their influence on flood extents and depths. The flood inundation modelling built upon the TUFLOW model and also looked in limited detail at the impact of partial harbour wall collapse and combined probabilities of still water and tidal scenarios.

Despite significant modelling activity to date, data quality and robustness of results remains uncertain. Limitations in modelling approach, the use of now outdated methods and the recent publication of new climate change and coastal flood boundary condition datasets require appropriate future consideration.

Figure 9 is an example of the mapped outputs (although recognised to be in need of refresh and update) from modelling produced to depict the predicted flood extent across Weymouth during a 1 in 50, 100 & 200-year return period extreme tidal still water event during the 2065 scenario.

Figure 9: Predicted flood extent of 1 in 50, 100 & 200-year return period combined (tide, surge and wave overtop) event during 2065 scenario (JBA Consulting, 2019c). (Note: Sea level rise predictions have increased since the undertaking of this numerical modelling)



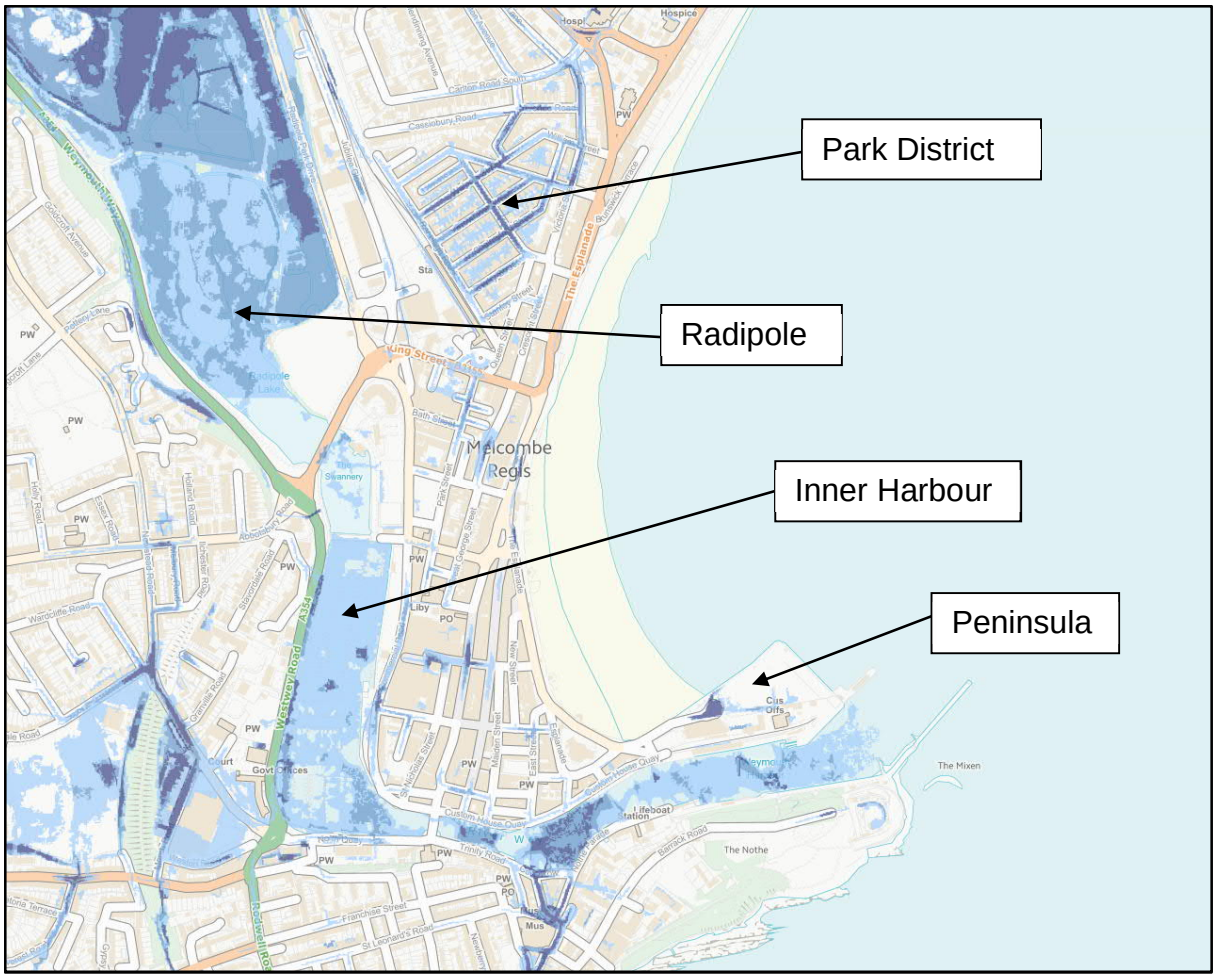
2.4.5 Surface water risk

Weymouth also has existing surface water flood risk, prominent in the low-lying Park District of the town, which is serviced by a combined foul water and surface water drainage system (operated by Wessex Water). The Park District is significantly lower than the Esplanade, by approximately 1~1.52m in places. Surface water and wave overtopping from the Esplanade has the potential to flow down the side roads into the Park District area and pond there causing problems both in terms of the depth of flood water and its velocity, resulting in significant hazard and additional pressure on an already stretched historic combined sewerage system with limited capacity.

The vulnerability of the people in the areas at risk of surface water flooding, and secondary surface water flooding associated to wave overtopping, must also be taken into consideration as part of the FCRM scheme options. There are a number of care homes and retirement flats in the Park District area, with a more vulnerable population. They would be at increased risk from a flood event and would require more significant assistance should an evacuation be required. The Park District area is acknowledged as having a high level of deprivation and is listed within the highest decile of the English indices of deprivation.

Figure 10 shows the Environment Agency Long Term Flood Risk Map filtered on Surface Water flood extents (only) centred on Weymouth town, (note – does not recognise surface water flood risk as a consequence of wave overtopping or tidal seepage from the Esplanade).

Figure 10: Environment Agency Long Term Flood Risk Map filtered on surface water flood extents (Environment Agency, 2021a)



2.4.6 Fluvial Flood Risk

Whilst the dominant flood risk source is that of tidal inundation, made more severe through sea level rise, the 'Main River' River Wey flows behind the town centre and discharges into the harbour, via sluice gates at Westham Bridge.

Previous modelling undertaken in Weymouth Model Updates (JBA Consulting, 2016) considered combined tidal and fluvial joint probability events and simulated these with varying return periods and climate change scenarios. The outputs of such, demonstrated that combined events are significantly biased to the tidal event, this having the strongest influence on the flood risk. Simulated flooding extents and depths during such an event was, therefore, very similar to the tidal event, with the main risk arising from the harbour.

Fluvial baseline simulations found that even with increases in river flows, Radipole Lake absorbs much of the impact from a fluvial event. Westham Bridge and its associated sluice gates limits the discharge into the harbour, thereby removing any fluvial only flood risk downstream of the bridge.

The importance of the management of Radipole Lake and the requirement for and operation of Westham Bridge sluice gates must be considered to ensure their effectiveness for both flood risk management and nature conservation purposes.

2.4.7 Coastal Erosion Risk

Within Weymouth Bay, erosion risk is present along both (i) the Esplanade (Weymouth seafront – managed under an approved Beach Management Plan (Jacobs, 2019)), (ii) Weymouth Harbour and iii) Preston Beach (Lodmoor seafront), which are considered further hereafter. As stated earlier in the Strategic Case, management of coastal erosion of the Preston Beach frontage to the north of Weymouth Esplanade, lies outside the extents of this FCRM scheme. Interaction between the cells will be further explored and refined in the next stages of FCRM scheme development, noting that previous studies (JacksonHyder, 2018) supported this separation.

(i) The Esplanade (Weymouth seafront)

The risk is greatest to the northern part of the Weymouth seafront area, between the Pier Bandstand and the Greenhill Groyne. The risk would increase if the seawall were to fail as a result of being undermined, particularly during storm events.

Once defences have failed and coupled with sea level rise, a period of initial 'coastal catch-up' would most likely occur. Coastal catch up describes the behaviour of the coast which can exhibit an increased level of short-term shore retreat in the immediate period following the loss of coastal protection before recession falls to a lower and more constant rate.

Coastal erosion at rates between 0.5-1.0m/year poses risk to properties (Jacobs, 2019), Greenhill Gardens and the B3155 highway which runs parallel to the shoreline.

Figure 11 illustrates a predicted erosion loss of between 25 and 50m after 50 years after the point of defence failure, which would rise to between 50 and 100m after 100 years (Jacobs, 2019). An erosion loss of just 25m would render the loss of the promenade as well as the majority of properties located between the beach and the B3155 road which will be further reviewed as part of the next stage (OBC) of the FCRM scheme development as the proposed option development progresses.

Figure 11: **Map of Coastal Erosion Risk Zones** ***(Jacobs, 2019)***

(ii) Weymouth Harbour

In a Do-Nothing scenario respective sections of Weymouth Harbour quay walls will come to the end of their useful life and will fail, leading to the commencement of erosion. This results in an initial erosion envelope that occurs in the year of wall failure, then a yearly advancement of erosion given the anticipated twice daily tidal scour action and the friable nature of the ground beneath Weymouth. Figure 12 illustrates properties and their distance to the initial erosion envelope.

Figure 12: **GIS Map of Weymouth harbourside properties coloured by their distance from the initial erosion envelope as marked by the purple line *(WSP UK Ltd, 2019)***

(iii) Preston Beach (Lodmoor seafront)

The Preston Beach frontage comprising a managed beach frontage and an engineered raised wall seaward of Preston Road forms the next flood cell north from Weymouth Harbour and the Esplanade which is maintained and operated by the Environment Agency.

The management and any future raising requirements of the flood defences within the Preston Beach flood cell will be required to ensure a comprehensive FCRM scheme within Weymouth.

Further consideration regarding of the long term flood risk management and adaptation proposed at Present Beach could impact on the scope of this FCRM scheme and may present opportunities for efficiencies between adjacent FCRM strategies.

2.4.8 Groundwater Flood Risk

It is understood that the groundwater flooding within Weymouth may be linked to tidal water levels and associated seepage through the historic Weymouth Harbour quay wall (JacksonHyder, 2018).

It is also understood that parts of Weymouth are situated on alluvial valley deposits and have spring/groundwater flood risk potential.

Consideration of the connectivity between tidal, fluvial and groundwater levels and flooding will be a key consideration in the FCRM scheme development.

2.5 Objectives

The key objectives for the scheme have been set to reflect the importance of delivering robust and sustainable infrastructure, whilst acknowledging the importance of the area for commercial business, future redevelopment opportunities and tourism purposes.

The objectives of the scheme were considered and discussed at length by both the members of the Project Steering Group and Project Board. Formal adoption of the objectives below was confirmed by the Project Board, March 2021.

1. To manage the risk of flooding and coastal change to people, property, infrastructure and activities over the next 100 years.
2. To develop an understanding of future climate change impacts beyond the next 100-years, in order to provide time for the community to adapt to a changing climate, whilst recognising Dorset Council's declared Climate and Ecological Emergency.
3. To provide a platform for future regeneration and growth of the town centre, Weymouth Harbour and the Esplanade, whilst ensuring construction minimises disruption to local residents, businesses and existing harbour and beach operations.
4. To provide the opportunity to enhance the public waterfront and recreational route around Weymouth Harbour and along the Esplanade.
5. To ensure the historic environment is protected, preserving where possible historic features and the heritage of the town.
6. To align with the policies set out in the Dorset Local Plan.
7. Deliver environmental enhancement and overall improvement in the quality of the natural environmental.
8. To identify solutions that efficiently minimises carbon emission impacts and make a positive contribution towards carbon emission reduction in support of Dorset Council's Climate and Ecological Strategy targets for carbon reduction.

2.6 Current arrangements

The existing Weymouth Harbour and the Esplanade frontage consists of multiple construction types, forms, ownerships and highly variable condition states. There are a number of existing formalised FCRM assets owned and operated by both Dorset Council and the Environment Agency.

The project area is included within the Environment Agency's flood warning service and is identified by five separate flood warning areas.

In general terms, Dorset Council are continuing their Flood & Coastal Erosion Risk Management function in line with legislative requirements, policies and strategies. These activities include:

- flood risk investigation & improvements;
- beach management strategies & coastal monitoring;
- cliff defence and coastal asset management;
- inspection, maintenance and management of FCRM assets;
- environmental enhancement projects; and
- promoting and delivering capital works.

2.7 Main benefits

The scheme will deliver a high standard of protection against flood and coastal erosion for Weymouth; reducing risk to properties, businesses, infrastructure and commerce up to 2120 and beyond. Whilst the Outcome Measure 2 (OM2) count is modest at 1,036 households, the overall economic benefit better portrays the scale and effect of the potential flood risk reduction. It should be noted that there are significant 'people-related' benefits associated with the scheme which is the over-riding focus of the next six-year government investment plan for flood and coast risk projects.

The total economic benefit to the nation as currently assessed is c.**£470m** when compared with the Do Nothing scenario.

Local financial benefits are significant by avoiding damage to properties and infrastructure, disruption to businesses and tourism, and unlocking appropriate sites for growth.

2.8 Strategic risks, assumptions, constraints and dependencies

A full risk register (see Appendix E) has been produced and used actively through the project by both the Project Delivery Team and Project Board. The risk register is reviewed at least monthly, the top risks of which are summarised in Table 4 below.

Table 4: Summary of Significant Risks based on Risk Register (see Appendix E)

RR No	Key Risk	Mitigation
001-002	Covid-19: Impact on future perception and use of public realm streetscape impacting current design and potential project delay associated to restrictions	Monitor evolving changes alongside design development and integrate potential delay uncertainties into OBC programme.
003-004	Strategy endorsement: Statutory and non-statutory support/ objection resulting in delay to scheme implementation and potential scheme design changes	Clear governance structure, reporting, progress/ review and programme identified and continually reviewed. Prepare and implement stakeholder engagement plan early in OBC to influence strategy development (inc. key stakeholders, organisations, landowners, user groups, and other relevant interested parties).
005-006	Funding: Benefit & Cost certainty and potential resulting funding gap	Undertake comprehensive modelling to establish robust damages/benefits assessment. Develop funding strategy and refine project costs further during OBC through further assessment and survey work to increase confidence and reduce funding gap if identified. Work in collaboration with EA to be aware of any forthcoming changes to the PF calculator algorithms or funding mechanisms.
007-012	Planning and consenting (including environmental impacts): Objection and delay to implementation of scheme with risk to further assessment work, mitigation and design changes	Prepare and implement stakeholder engagement plan early in OBC development to influence strategy development with relevant engagement and pre-app/ scoping/ screening identify further proportionate environmental assessment work, project risks, mitigation requirements and opportunities to inform the cost plan, programme and design. (Engagement inc. key stakeholders, organisations, landowners, user groups, and other relevant interested parties).
013-017	Earthworks/ Ground penetrating works/ contamination/ asbestos: Risk of delay/ design change	Proportionate survey work to be undertaken to inform design development. Preliminary investigations (e.g. desk top study) to be undertaken at OBC stage

RR No	Key Risk	Mitigation
	from identification of site constraints	with further requirements identified to inform future design development.
019	Buildability and constructability: hydraulic modelling changing the design parameters currently considered leading to abortive or design rework	Undertake further hydraulic modelling early in OBC to inform the basis of design.
018-020	Buildability and constructability: Unexpected engineering complexities and interaction with existing built environment	Undertake proportionate concept/ outline design development as part of OBC taking into account associated assessments/ studies to develop robust scheme to be taken forward with identification and management of risks through proportionate risk management process in accordance with CDM 2015 requirements.
021-022	Maintenance & Operation and Public Safety: Asset deterioration and risk of failure which may increase over time associated to more frequent and extreme storm events	Continue to monitor condition and deterioration of existing assets to refine and influence strategy phasing at OBC stage, in accordance with CDM 2015 requirements (including proposed asset future). (This may include asset register based on EA AIMS data). Future inspection and maintenance strategy (or operational maintenance manual) of existing assets to be developed alongside detailed design including integration of cost allowance for anticipated future intervention as part of OBC whole life costing.
022-024	FCRM and Public Safety: Exceedance of SoP, increased rate of climate change and impact on public safety/ emergency access	Continue to develop design against current national climate change guidance with sensitivity assessment for various alternative scenarios as part of OBC to inform basis of design. Design to consider impact of work and extreme event impact on public safety, access and egress during works and during operation throughout assessment period.
025-026	New policy, guidance documents, appraisal tools or emerging scheme that could impact the FCRM Scheme	Monitor evolving changes and emerging scheme and integrate into OBC with allowance for potential delay uncertainties into OBC programme and cost profile/ optimism bias/ risk allowance

There are a number of constraints on the FCRM scheme, as listed below;

- The need to minimise disruption (both in construction and operation) to adjacent businesses, harbour operations and the residents & community of Weymouth.
- The town is heavily used in the summer months as a tourist destination and as such construction works need to have due regard.
- The requirement not to increase flood risk (adverse impact) due to implementation of the scheme through any permanent or temporary works.
- Recreational boat use, an active commercial fishery and RNLI Lifeboat Station exist in Weymouth Harbour. Impacts to navigation and marine construction works are of particular importance to this stakeholder group.
- Funding constraints given the multiple funding partners required in order to ensure viability.
- The need to minimise impacts on the natural terrestrial, marine and historic environment.

2.9 Dependencies

The FCRM scheme is dependent upon obtaining multiple consents, licenses and permissions to carry out the required construction work.

Realisation of the full benefits over the 100-year scheme appraisal duration is dependent upon future continued implementation of the adaptive pathway, notably in 2040 and 2060. Therefore, securing commitment to future capital funding and ongoing maintenance is an essential dependency.

Agreements with individual affected landowners and approval from statutory undertakers for any alterations to apparatus will be required.

Economic Case

Is there a case for investment?

3.0 Economic Case

3.1 Introduction

Throughout this section, 'options' should be considered as preferred strategic approaches or ways forward for the FCRM scheme, as opposed to finalised engineering designs.

The economic case for the project has been appraised in accordance with the standard guidance for the appraisal of flood risk management projects, including:

- Flood and Coastal Erosion Risk Management: Appraisal Guidance (Environment Agency, 2010);
- Flood and Coastal Erosion Risk Management: A Manual for Economic Appraisal 1st Edition ('The Multi-Coloured Manual') and accompanying Handbook (E. Penning-Rowsell, et. al., 2013);
- The Green Book: Central Government Guidance on Appraisal and Evaluation (HM Treasury, 2020) and associated supplementary guidance; and
- Flood and coastal risk projects, schemes and strategies: climate change allowances (Environment Agency, 2020a).

3.2 Critical success factors (CSF)

The Critical Success Factors (CSFs) are the attributes that are essential to the successful delivery of the FCRM scheme.

Table 5 sets out the CSFs for the project as defined by the project team and endorsed by the Project Board during a Project Board Meeting held on 12 January 2020 and subsequent meeting actions.

Table 5: Critical Success Factors

No	Critical Success Factor	Measurement Criteria	Importance (1-5) (Where 1=high, 5=Low)
1	Policy	Is the preferred option in line with the National FCRM Strategy, SMP, Approved FCRM Strategy, council strategy and cabinet decisions and Local/Business Plans?	1
2	Affordability	Is Partnership Funding required in addition to FDGiA, and are contributions (including any Dorset Council commitment) likely to be forthcoming?	2

No	Critical Success Factor	Measurement Criteria	Importance (1-5) (Where 1=high, 5=Low)
3	Technical	Is the option technically sound i.e. able to provide the required FCRM function? Can the option be implemented without unacceptably high technical risks and accommodated within the existing constraints?	2
4	Environment	Is the option likely to be acceptable from an environmental, heritage & carbon standpoint? Can the option be delivered with an acceptable level of disruption to harbour and beach operations? Does the option provide additional benefits in terms of ecology and the local community (beyond risk reduction)?	2
5	Health, Safety & Wellbeing	Is the option safe to construct, through its design life and in future? Does the option provide an acceptably low level of risk for users (the public, maintenance staff etc)	1
6	Amenity	Does the option provide for present and known future amenity use?	2

3.3 Options Considered

The following section provides a summary of the identified options and the economic appraisal work that has been undertaken to date to inform the FCRM scheme. The long list and short list of options has been developed based upon a number of previous studies, including:

- Weymouth Flood Risk Management Strategy (Environment Agency, 2010);
- Weymouth and Portland Borough Council Weymouth Bay Coastal Processes Study Weymouth Harbour and Esplanade (JacksonHyder, 2018);
- Weymouth Harbour & Esplanade: FCRM Strategy Update (WSP UK Ltd, 2019);
- Weymouth Harbour Walls Condition Survey 2018-19 (Masonry Wall Condition Survey Report) (JBA Consulting, 2019a);
- Weymouth Harbour Walls Condition Survey 2018-19 (Sheet Pile Condition Survey Report) (JBA Consulting, 2019b);
- Weymouth Beach Management Plan (Jacobs, 2019); and

- Weymouth Harbour & Esplanade Flood and Coastal Risk Management Strategy (Dorset Council, 2020c).

Within the option consideration three broad approaches have been considered:

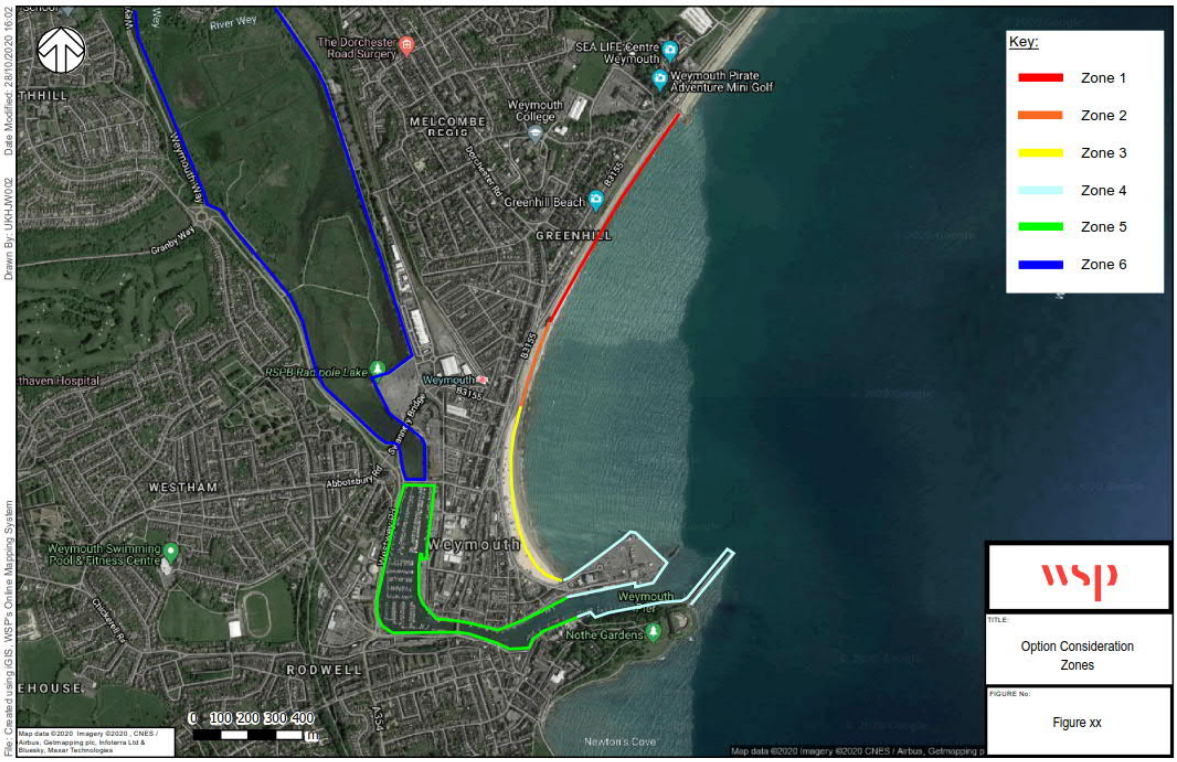
- Do Nothing – assumes no further intervention including cessation of all maintenance and operation.
- Do Minimum – maintain the 'status quo' through continued maintenance and operation of the existing assets, however no new assets or asset raising.
- Do Something – can consider a combination of maintaining existing assets, constructing new assets and/ or retrofitting existing assets to provide a Standard of Protection (SoP) against tidal flooding of at least a 1 in 200 year return period event (0.5% AEP) over the appraisal period. SoP for wave overtopping limits, fluvial flooding, surface water and drainage capacity and joint probability scenarios should be defined at OBC stage, recognising the dominant flood risk source is tidal.

Three groups with six zones are considered throughout the FCRM scheme extent for the differing interventions/measures against each zone's local setting, flood/erosion risk profile and their associated constraints and opportunities. The groups and zones are summarised in Table 6 and Figure 13.

Table 6: Weymouth Harbour and Esplanade Zones

	Group	Sub Section	Location	Risk Sources
Zone 1	Esplanade	North	Greenhill Groyne to Pier Bandstand	Tidal inundation, wave overtopping, coastal erosion, groundwater, surface water tide locking
Zone 2		Central	Pier Bandstand to Jubilee Clock	
Zone 3		South	Jubilee Clock to Pavilion Peninsula	
Zone 4	Harbour	Outer	Pavilion Peninsula to Harbour Foot Ferry Harbour Foot Ferry to Nothe Point	Tidal inundation, wave overtopping, groundwater, surface water tide locking
Zone 5		Inner	Harbour Walls inland from Zone 4	Tidal/ fluvial inundation, groundwater, surface water tide locking
Zone 6	Radipole Lake		North of Westham Bridge	Fluvial inundation, fluvial and surface water tide locking

Figure 13: Weymouth Harbour and Esplanade Zones



A long list of options has been considered within each group to define a short list and strategy preferred option for the FCRM scheme. The long list assessment has used a qualitative multi criteria assessment with consideration of criteria summarised within Table 7.

Table 7: Long List Assessment Criteria

Group	Attributes
Engineering	• Technical Feasibility/ Constructability • Durability/Maintenance • Safety (Construction & Long Term)
Economics	• Benefit/ Loss • Capital Cost • Maintenance/ Operational Cost
Environmental and Social	• Impacts • Enhancement Opportunities
Flood and Coastal Erosion Risk	• Current day • Future flood risk

3.3.1 Long List of Options

Table 8: Long List of Options

	Option Group	Description Overview	Technical (Design & Delivery)	Environmental and Social	Economic	Flood Risk (including climate change)	Shortlisted/ Rejected
Zone 1, 2 & 3	Do Nothing	Assumes no further intervention including cessation of all maintenance and operation.	Lack of maintenance may lead to reduced serviceable life and SoP of asset.	Reduced beach amenity could have a negative impact on human health benefit. Promenade may become danger to public if not maintained and as a result of increased overtopping rates. Reduced beach width reduces socio-economic value to public. Townscape could fall into disrepair from continued storm damage and increased overtopping, this will become increasingly unsightly with storm debris and damage. Cultural assets (including a number of listed building) are likely to be damaged from increased overtopping. Damaged assets and increased overtopping may restrict pedestrian and vehicle access.	No Capital Expenditure (CapEx) and Operational Expenditure (OpEx). Damage and increased frequency of overtopping could have a significant impact on local tourism, trade, businesses, property and infrastructure limiting potential for economic growth.	Current day some overtopping from high return periods. Reduced SoP and increase in risk of flooding into the future associated to sea level rise with increased risk of breach/ inundation and wave overtopping. Reduced beach width increases the risk of undermining/ scour of the promenade assets which increases the risk of erosion and a breach of the defence.	Shortlisted for appraisal purposes.
	Do Minimum	Maintain the 'status quo' through continued maintenance and operation of the existing assets, however no new assets or asset raising.	Disproportionate increase in maintenance expected into the future		Low CapEx. Disproportionate increase in OpEx in future with increased overtopping resulting in increased asset deterioration. Significant impact on local tourism, trade, businesses, property and infrastructure. Damage and increased frequency of overtopping could have a significant impact on local tourism, trade, businesses, property and infrastructure limiting potential for economic growth.		Shortlisted for appraisal purposes.
	Do Something	Beach management.	Periodic beach recycling to maintain beach levels to reduce risk of wave overtopping flooding and undermining of seawalls that could lead to failure and onset of coastal erosion (Jacobs, 2019). Increased SoP of erosion protection measures reduces the risk of undermining to flood protection assets.	Maintaining beach width provides socio-economic value to public. Impacts on ecology and aquatic ecology are to be considered as part of beach management (Jacobs, 2019).	On-going OpEx, potential for future CapEx to maintain beach management.	Erosion protection and flood risk benefit.	Shortlisted.
		Promenade/ wall erosion protection.					
		Property flood resilience.	Design feasibility of integrating measures into listed building and between buildings requiring cohesive design with a number of public and private stakeholder.	During deployment, likely to impede pedestrian and vehicular access. Impact on townscape and listed buildings.	Significant CapEx and future OpEx with multiple stakeholders.	Reliance on deployment may disproportionately increase into future as overtopping increases. Continued overtopping would overwhelm public drainage network.	Rejected.

	Option Group	Description Overview	Technical (Design & Delivery)	Environmental and Social	Economic	Flood Risk (including climate change)	Shortlisted/ Rejected
		Surface water drainage enchantments (gravity outfalls, attenuation, pumping).	Feasibility of achieving a gravity discharge is limited and may require a pumped discharge.	Increased drainage capacity would reduce the risk of combined sewer surcharging and risk to human health.	On-going OpEx for pumped discharges.	Flood risk benefit during high tide events when tide locking prevents discharge.	Shortlisted.
		Raised/ crown/ recurve/ wave wall (at front of promenade, set back, either with or without promenade raising) with nearshore or offshore breakwater.	Design feasibility of breakwater. Breakwater would reduce nearshore wave energy and reduce the heigh of wall required to limit overtopping to a save level.	Impact of breakwater on local and regional sediment transport and evolution, regional erosion, and aquatic ecology. Townscape and visual impact of a breakwater and wall. Wall impact on linkage between the town, promenade and beach Impact of breakwater on recreational and international sailing and other water sports.	Potential reduced tourism from adverse effects to local economy as a result of breakwater effect on water sports. Significant CapEx and OpEx.	Reduce nearshore wave energy and overtopping.	Rejected.
		Demountable defences.	Design feasibility of limiting wave overtopping.	Limited impact on townscape and visual when demountable defences are not deployed.	CapEx for retrofitting the existing promenade to include. OpEx for maintenance, storage and deployment of demountable defences.	Flood risk benefit, however reliant on advance warning to enable deployment in time. May require increased frequency of deployment into the future.	Rejected.
		Raised/ crown wall (at front of promenade, set back, either with or without promenade raising) without breakwater.	Structural and geotechnical feasibility of building raised walls on existing historic assets with limited foundations. Assessment required to determine if new construction is more appropriate when considering whole life costing. Spatial constraints associated to introducing ramps/ steps to maintain public access over raised walls would require appropriate spatial planning maintain local setting.	Townscape and visual impact of local setting from a raised wall. Wall impact on linkage between the town, promenade and beach.	CapEx and OpEx. Whole life costing should consider the potential benefit of wholesale replacement with option of replacement and future raising being staged into the future to align with future sea level rise.	Erosion protection and flood risk benefit.	Shortlisted.
Zone 4 & 5	Do Nothing	Assumes no further intervention including cessation of all maintenance and operation.	Walls are expected to fail by 2040 if not maintained, leading to collapse of surrounding properties and infrastructure.	Harbour may become danger to public and commercial operations if not maintained and as a result of increased frequency in flood events. Townscape could fall into disrepair from continued storm damage and increased	No CapEx and OpEx, Damage and increased frequency of flood events could have a significant impact on local tourism, trade, businesses, property and infrastructure limiting potential for economic growth.	Asset failure would lead to tidal inundation and erosion, with significant risk to property and life. Future risk of overtopping of remaining assets	Shortlisted for appraisal purposes.

	Option Group	Description Overview	Technical (Design & Delivery)	Environmental and Social	Economic	Flood Risk (including climate change)	Shortlisted/ Rejected
	Do Minimum	Maintain the 'status quo' through continued maintenance and operation of the existing assets, however no new assets or asset raising.	Current day crest provides SoP less than 0.5% AEP tidal event and has no freeboard for climate change. SoP would reduce and continued tidal exposure may decrease serviceable life and any rebuild to the same SoP would provide a disproportionate benefit.	frequency in flood events, this will become increasingly unsightly resulting in degeneration. Cultural assets (including a number of listed building) are likely to be damaged from increased overtopping. Damaged assets and increased overtopping and increased frequency in flood events may restrict pedestrian and vehicle access.	Low CapEx. Disproportionate increase in OpEx in future with increased overtopping resulting in increased asset deterioration. Significant impact on local tourism, trade, businesses, property and infrastructure. Damage and increased frequency of flood events could have a significant impact on local tourism, trade, businesses, property and infrastructure limiting potential for economic growth.	Current day crest provides SoP less than 0.5% AEP tidal event and has no freeboard for climate change, therefore SoP would decrease over time resulting in increased risk and frequency of flooding.	Shortlisted for appraisal purposes.
	Do Something	Sea/ quay wall replacement (sheet piled wall with tie-back, diaphragm cut off wall, masonry or concrete retaining wall).	Varying condition and interim defence raising with varying crest level throughout Weymouth Harbour creates a technical challenge. Requirement for future maintenance/ replacement of existing aging assets reaching end of serviceable life. Existing isolated areas of existing seepage under the defence through older life expiring assets Negative impact on operation and appearance for Weymouth Harbour must be embedded into the design to maintain its value. Options should consider these users needs can be integrated into the design.	Continued safe amenity for human health/ environment. Temporary impact on human health from limited access to amenity and construction related impact during works (e.g. noise, dust etc.). Reduced degeneration and degradation to townscape. Potential impact on visual appearance from raised walls. Reduced risk of overtopping affecting cultural/ list building assets. Impact on access for pedestrians, vehicles and vessels.	Help maintain development and economic growth as a safe place from flood risk to maintain its tourism attraction. CapEx and OpEx required.	Current crest level provides SoP less than current day 0.5% AEP event with no freeboard for climate change. Significant FCRM benefit to residential and commercial property. Raising walls at Zone 4 provides limited FCRM benefit, however, could provide significant opportunity for future economic growth in this area. Wall raising within Zone 4 should be included within the strategic approach to ensure a coherent and efficient delivery that could unlock future development and economic growth.	Shortlisted.
		Demountable defences.	Design feasibility of limiting wave overtopping. Reliance on successful deployment and assumed effectiveness in each flood condition.	Limited impact on townscape and visual when demountable defences are not deployed.	CapEx for retrofitting the existing promenade to include. OpEx for maintenance, storage and deployment of demountable defences.	Flood risk benefit, however reliant on advance warning to enable deployment in time. May require increased frequency of deployment into the future.	Rejected (Note: To be revisited at OBC optioneering and appraisal stage).

	Option Group	Description Overview	Technical (Design & Delivery)	Environmental and Social	Economic	Flood Risk (including climate change)	Shortlisted/ Rejected
		Tidal barrier and maintain Weymouth Harbour walls at existing defence height.	Due to CapEx a barrier would need to be implemented to provide a SoP up to the end of the assessment period (potentially longer if feasible within the design), however will provide limited benefit in short to medium term, therefore significant CapEx and OpEx would be incurred from year zero with benefit only recognised in long term. Opportunity to implement in future as part of adaptive pathway approach. Fluvial floodplain storage capacity when tidal barrier in operation would need to be considered within Weymouth Harbour and Radipole Lake from the River Wey inflow with consideration for joint probability events throughout design life. Potential need for pumped outfall to prevent fluvial inundation.	When barrier in operation potential increased saltwater mixing and tidal inundation could impact on Radipole Lake, designated sites, WFD status associated habitats including (ecology, flora & fauna, fresh water and saline aquatic ecology). Depending on barrier form and location, it is likely to impact on commercial and recreational vessel operation (including current RNLI Station and Pontoon).	Significant CapEx and OpEx.	Impact on upstream fluvial flood risk and tide locking when barrier is in operation with consideration for joint probability and climate change scenarios required to be embedded into design. Significant FCRM benefit to residential and commercial property.	Shortlisted.
Zone 6	Do Nothing	Assumes no further intervention including cessation of all maintenance and operation.	Sluices and mechanical elements likely to fail reducing the ability for River Wey to discharge to Weymouth Harbour and Bay. No future raising may lead to increased risk and frequency of tidal overtopping into Radipole Lake.	Increased saltwater mixing and tidal inundation could impact on Radipole Lake, designated sites, WFD status associated habitats including (ecology, flora & fauna, fresh water and saline aquatic ecology). Damaged assets and increased overtopping and increased frequency in flood events may restrict pedestrian and vehicle access.	No CapEx or Op Ex, however potential significant impact on economy through flooding.	No future raising may lead to increased risk and frequency of tidal overtopping in the future within Radipole Lake. Reduced SoP into the future and risk of failure to flood defence assets resulting in defence breach.	Shortlisted for appraisal purposes.
	Do Minimum	Maintain the ‘status quo’ through continued maintenance and operation of the existing assets, however no new assets or asset raising.	On-going maintenance and repair of Westham Bridge sluices and mechanical elements required to maintain River Wey discharge to the Weymouth Harbour and Bay. No future raising may lead to increased risk and frequency of tidal overtopping in the future within Radipole Lake.		OpEx likely to increase into the future.	No future raising may lead to increased risk and frequency of tidal overtopping in the future within Radipole Lake. Reduced SoP into the future and risk of failure to flood defence assets resulting in defence breach.	Shortlisted for appraisal purposes.
	Do Something	Westham Bridge/ weir removal.	Removal of bridge and associated sluice/ weir.	Impact on Radipole Lake, upstream geomorphology and their associated habitats. Increased saltwater mixing and tidal inundation could impact on	Remove OpEx of Westham Bridge sluices and mechanical elements.	Significant change on upstream flood risk profile. Tidal extent would significantly increase into Radipole Lake	Rejected.

	Option Group	Description Overview	Technical (Design & Delivery)	Environmental and Social	Economic	Flood Risk (including climate change)	Shortlisted/ Rejected
				Radipole Lake, designated sites, WFD status associated habitats including (ecology, flora & fauna, fresh water and saline aquatic ecology). Impact on pedestrian and cycle access to town centre and reduction to available parking. Opportunity to increase capacity of Harbour, however, would have an impact on natural environment that would need to be balanced.		increasing the tidal flood risk to a number of locations. Reduce risk during fluvial peak events due to unrestricted outflow into Weymouth Harbour/ Bay. FRCM benefit to be further investigated at OBC through development of joint probability analysis to establish impact of future joint fluvial and tidal events on flood risk and SoP upstream of Westham Bridge.	
		Westham Bridge raising.	Raising flood defences in line with those proposed for Zone 5. Consideration of maintaining access over Westham Bridge.	Protect Radipole Lake from saltwater mixing. Change to Radipole Lake, designated sites, WFD status associated habitats including (ecology, flora & fauna, fresh water and saline aquatic ecology).	CapEx and OpEx.	Significant FRCM benefit by preventing tidal flood extent continuing up into Radipole Lake. FRCM benefit to be further investigated at OBC through development of joint probability hydraulic modelling to establish impact of future joint fluvial and tidal events on flood risk and SoP upstream of Westham Bridge.	Shortlisted.
		Increase flood plain storage and flood defence surrounding Radipole Lake.	The requirement for an increased fluvial flood plain storage capacity and raising flood defences within Radipole Lake needs to be investigated through further joint probability hydraulic modelling at OBC stage to consider the consequence of future combined fluvial and tidal flood events.	Change to Radipole Lake, designated sites, WFD status associated habitats including (ecology, flora & fauna, fresh water and saline aquatic ecology).	CapEx and OpEx.		Shortlisted.

3.3.2 Initial Short Listing

'Do nothing' and 'do minimum' options have been rejected in principle as they are not considered acceptable due to the significant negative impact and consequence associated with the risk of flooding and coastal erosion. They neither meet the critical success factors or the schemes' objectives.

The 'do nothing' and 'do minimum' scenarios have therefore only been considered to form a baseline for comparison to the 'do something' scenarios.

The short list of options incorporates an adaptive pathway approach to achieve a balance between maximising the benefits, whilst limiting the impacts of the intervention under a changing climate. The basis behind adaptive planning, is to generate a wide array of 'pathways' through which policy objectives are achieved under changing climate and socio-economic conditions. Three key elements are central to the adaptative pathways concept:

- Responses to changes that are effective under the widest set of all plausible future scenarios.
- Responses do not foreclose future options or unnecessarily constrain future choice.
- Relevant changes are foreseen through targeted monitoring and scenarios of the future are continuously being reassessed.

Proposed strategic adaptive pathways were considered within the Weymouth Harbour & Esplanade FCRM Strategy Update (WSP UK Ltd, 2019) and Weymouth Harbour & Esplanade Flood and Coastal Risk Management Strategy (Dorset Council, 2020c). The adaptive pathways seek to provide a 1 in 200-year standard of protection of flooding from the sea and prevent erosion until at least 2120. This time horizon is important to allow planning development to be brought forward with adequate FCRM.

Pathways consist of grouped 'do something' interventions, optimised to ensure that the SoP is maintained for the 100-year duration of the FCRM scheme. Technical, environmental & social, financial and economic impacts of such pathways are assessed to look for an optimal approach and are summarised in Table 9.

Table 9: Adaptive Pathway Options

	Pathway Option	Intervention
Zones 1,2 & 3 (Esplanade)	A	Phased approach to improve the existing defences along the esplanade. Interventions in years 0 and 50. Providing the 200-year standard for the 100-year scheme life.
	B	Advance the line approach to reprofiling the beach, removing the requirement for any structural work along the esplanade. Providing the 200-year standard for the 100-year scheme life and offering the scope for continuous

	Pathway Option	Intervention
		intervention into the long-term future, alongside sustained amenity benefits.
Zone 4 & 5 (Harbour)	1	All existing Weymouth Harbour quay walls replaced and raised in year 0, providing the 200-year standard for the 100-year scheme duration. No requirement for a tidal barrier.
	2	Phased replacing and raising of the harbour walls for the 100-year scheme life. Interventions in years 0, 20 and 50. No requirement for a tidal barrier. Providing the 200-year standard of protection up until year 100.
	3	Phased replacing and raising of Weymouth Harbour quay walls for the 50-year scheme life. Interventions in years 0 and 20. No requirement for a tidal barrier. Providing the 200-year standard of protection up until year 50.
	4	Phased replacing and raising of Weymouth Harbour quay walls. Interventions in years 0, 20 and 50. Tidal barrier implemented in year 20, reducing the requirement for upstream wall raising. Providing the 200-year standard for the 100-year scheme life.
	5	Phased replacing and raising of Weymouth Harbour quay walls. Interventions in years 0, 20 and 50. Tidal barrier implemented in year 50, reducing the requirement for upstream wall raising. Providing the 200-year standard for the 100-year scheme life.
Zone 6 (Radipole Lake)	1	Phased raising of flood defences and/ or flood plain storage capacity increase, and Westham Bridge maintenance and further intervention to be confirmed through further investigation and results of integrated hydraulic modelling including joint probability analysis for future scenarios.

To inform all Weymouth Harbour and the Esplanade ‘Do Something’ options, assets have undergone further recent condition inspection and appraisal (JBA Consulting, 2019a) & (JBA Consulting, 2019b) to determine anticipated residual life and detailed crest heights. The scheduling of interventions has then been calculated by the earlier of the two scenarios listed below:

- The exceedance of the existing crest level by the corresponding 1 in 200 year flood level.
- The existing structure reaches the end of its residual life.

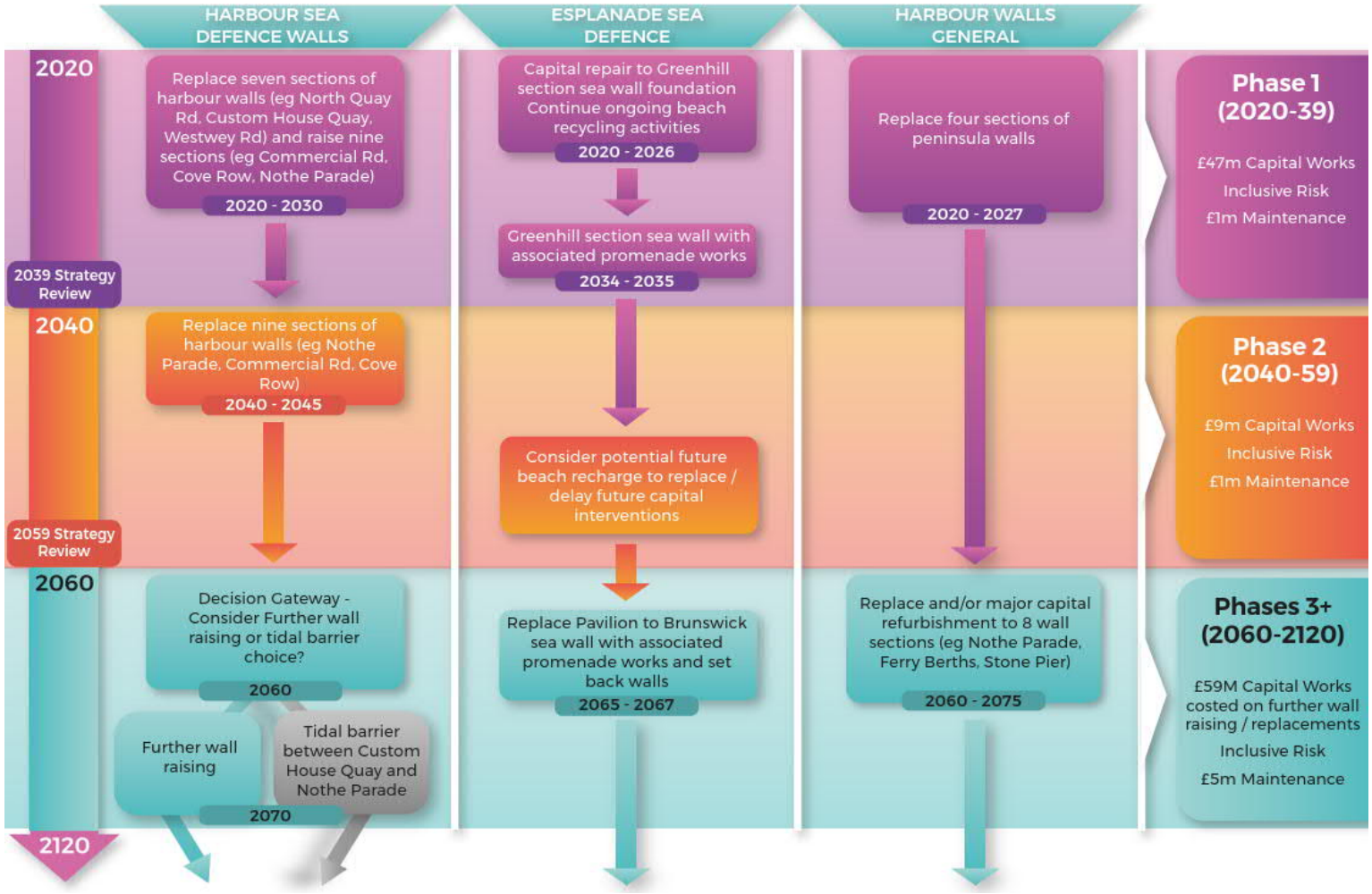
All assets and their respective interventions can be found within the detailed tables contained in Appendix B – Financial Case Technical Note. The preferred strategic pathway for the FCRM scheme, as presented in Figure 14 includes phased approaches to wall raising, wall replacements and the possible inclusion of a future

tidal barrier and enables flexibility for further optioneering and refinement to the proposed intervention at the OBC stage.

It should be noted that the consideration of demountable flood defences, in likely combination with other interventions will be necessary at optioneering stage. This may be required for example, to provide an adequate standard of protection in advance of full scheme completion, or to provide ‘gap-filling’ to allow the realisation of benefits.

It is expected that comprehensive options appraisal will be undertaken at OBC stage.

Figure 14: Weymouth Harbour & Esplanade FCRM Scheme Preferred Strategic Pathway (Dorset Council, 2020c)



Note: Since publication of the above document, the location of a tidal barrier has been reviewed. A more suitable location may be the Peninsula although this is a detail for further consideration at OBC stage.

3.4 Economic appraisal

The economic performance of a FCRM scheme is determined through its BCR. Benefits are measured in terms of the PV of economic damages avoided over the lifespan of the scheme, with the present value of scheme capital and maintenance costs also being estimated over the same period.

3.4.1 Assessment of benefits

The economic appraisal was undertaken to the guidance set out within the Flood and Coastal Erosion Risk Management: A Manual for Economic Appraisal (E. Penning-Rowsell, et. al., 2013) also known as the 'Multi Coloured Manual' (MCM and the Flood and Coastal Erosion Risk Management: Handbook and Data for Economic Appraisal 2020 (E. Penning-Rowsell, et. al., 2020) also known as the Multi-Coloured Handbook (MCH) and is presented in full in Appendix A – Economics Assessment. It should be noted that the assessment is considered high level and was undertaken early in the FCRM strategy process to provide confidence around scheme viability.

This assessment has undertaken analysis of Grant in Aid eligible benefits, which are attributable to the reduction of flood and coastal erosion risk and reflect economic impacts on the nation. These will form the basis for the assessment of the quantum of Grant in Aid that may be available to the FCRM scheme, as calculated using the Partnership Funding Calculator (Environment Agency and Department for Environment, Food & Rural Affairs, 2020b).

The FCRM scheme will reduce the flood and coastal erosion risk to residential and commercial properties and important local infrastructure. The benefits of each of the options has been quantified by calculating the damage prevented during flood events with an AEP between 50% and 0.1% (1 in 2 years and 1 in 1000 years). Direct and indirect benefits have been considered in this assessment.

The key facts and assumptions that have been incorporated into the economic appraisal are summarised below.

- Damages are based on a GIS level assessment which maps the flood extent based on the elevation components of the flood event and its hydraulic connectivity to the surrounding area based on its topography. (Note: This methodology was chosen appropriate to SOC stage development, as opposed to using computer modelled outputs from earlier studies, given the data reliability issues discussed previously in Section 2.4.4).
- The Gross Domestic Product (GDP) Deflator Index has been applied to the PV damages.
- Base year assumed taken as 2020 with a 100-year appraisal period.
- Climate change allowance using UKCP18 95th percentile of RCP 8.5.

- Discount rates separated to Standard (starting at 3.5%) and Health (starting at 1.5%) (Environment Agency and Department for Environment, Food & Rural Affairs, 2020a).
- Direct flooding damages to properties and vehicles.
- Mental health damages from flooding and erosion (Environment Agency, 2020c).
- Commercial intangible losses.
- Benefits to stress and health through mitigating flood risk.
- Predicted erosion losses. (Noting that eroded properties are removed at their year of loss from the dataset to prevent accrual (and thus double counting) of flood risk damages).
- All economic losses use the latest MCM guidance (E. Penning-Rowsell, et. al., 2013) and MCH tabulated data (E. Penning-Rowsell, et. al., 2020).
- 10.7% of property damage value added to account for emergency services costs.
- Clean up costs are included within depth-damage data from MCM (E. Penning-Rowsell, et. al., 2013).
- Damages capped at the estimated 'risk free' property market values from UK House Price Index (HM Land Registry, 2020).
- Once a property has been capped, all additional damages associated to that property stop accruing (evacuation, mental health damages, Risk to Life etc.).
- Road closure disruption and road infrastructure damage included for main routes.

3.4.2 Assessment of costs

Present Value Costs (PVc) for the adaptive pathway approach in comparison to baseline scenarios are shown in Table 10. Further details on cost assessment are provided in Appendix B – Financial Case Technical Note.

Cost estimates consider; asset type, height, length, work type etc., and are conservatively determined using the Environment Agency Long Term Costing Tool (Environment Agency, 2015a) and contractor supplied data from similar schemes.

Professional fees and survey costs have been derived by the project team using assessment of recent similar work type costs.

The base date for the cost estimates and benefits is 2020.

For the purposes of allowing for risk contingency within the 100-year economic appraisal, consistent methodology in accordance with FCRM-AG has been applied. A 60% rate has been applied equitably to all options and future capital costs.

Table 10: Initial Economic Appraisal Results

Option	PVc £k	PVb £k	BCR
1 - Do Nothing	0	0	
2 - Do Minimum	£22m*	£458m	20.8:1
3 – Pathway 2A (Phased Wall raising, wall replacements & esplanade defences)	£52m	£470m	9:1
4 – Pathway 2A With Future Barrier	£57m	£470m	8.2:1

*Some steel sheet piled harbour wall assets cannot physically be maintained as they reach the end of their design life. A number of assets would have to be replaced for example as Dorset Council is the Statutory Harbour Authority.

3.4.3 Economic sensitivity

It should be noted that the potential inclusion of a tidal barrier intervention post year fifty as part of the FCRM scheme, whilst expensive in financial terms (at an estimated cash cost £29m), has limited impact to present day economic appraisal. This is solely due to the effect of discounting.

In addition, a further sensitivity assessment was undertaken to review the impact of replacing all of the steel sheet piled structures 50 years after their initial intervention. Given the high level nature of cost assessment and significant optimism bias budgets, an additional round of replacements equates to around 7% variation in Present Value Cost.

3.5 Carbon appraisal

At OBC stage as part of detailed appraisal, a carbon assessment will be undertaken using the latest industry guidance and modelling tools.

Dorset Council will seek to develop FCRM scheme options that efficiently minimise whole life carbon impacts by following the carbon management hierarchy. It is of significant importance to Dorset Council and this FCRM scheme will seek to make a positive contribution towards carbon emission reduction and Dorset Council's target of achieving net zero as a council by 2040 and as a county by 2050.

In addition, the damages assessment to date, has not taken account of the carbon losses associated with flood damages, which has the potential to be significant. Do-something options avoid such carbon impacts for example, from the emergency response and recovery prompted by flood events in the absence of investment.

Commercial Case

How will the scheme be delivered?

4.0 Commercial Case

4.1 Introduction and Procurement Strategy

Dorset Council has significant recent experience with Public Contract Regulations (PCR) 2015 (HM Government, 2015), procurement and tendering requirements and has internal resource capacity to lead these tasks. Dorset Council will achieve value for money and efficient corporate procurement of works, goods and services to meet its operational, financial, social and administrative corporate policies.

The business case development and production of this SOC has been completed by the Dorset Council team with support by consultant WSP UK, with advice provided by the Environment Agency's Wessex Area Partnerships & Strategic Overview (PSO) team.

It is anticipated that development of the OBC will be procured through the current Transport and Engineering Partnership (TEPS) Contract which is serviced by WSP UK and has been used to appoint WSP UK to support development of this SOC. The TEPS Contract and scope includes provision of services in relation to flood risk management and coastal schemes, and its use for the OBC stage will (a) enable prompt procurement, and (b) enable continuation of the knowledge developed by WSP UK to date to be carried forward into the OBC to make rapid progress without the need to get up to speed that an alternative supplier would have to.

At OBC stage, a decision should be taken regarding the optimum delivery path for the FCRM scheme (i.e. a traditional route with Detailed Design prior to awarding a delivery contract, or 'Design and Build'), depending on the scope of the design work and scale of the construction works. This will dictate the scope of the work needed to complete the detailed design stage.

To support this flexible approach, the next stage will be limited to the appraisal work needed to deliver the OBC only.

Full details of the commercial case for the detailed design and construction of the scheme will be presented in the OBC.

4.1.1 Key contractual terms & risk allocation

All services and works to be provided are likely to be based on the terms of the relevant New Engineering Contract (NEC) form of contract. The proposed contract choice for any services to be procured will be the NEC Professional Services Contract (PSC) and for the works it is anticipated to be the NEC Engineering and Construction Contract (ECC). NEC4 has replaced NEC3 as Dorset Council's preferred default form of contract.

Payment options to define the contractual approach are yet to be decided, however are likely to be either be NEC Option A or E (Priced Activity Schedule or Time Charge) for any design activity, and NEC Option A or C (Priced Activity Schedule or Target Cost) for the construction ECC. A Procurement Initiation Document (PID) recommending the approach will be set out by Dorset Council after SOC approval, once certainty of funding is in place. The PID will be assessed and signed off by Dorset Council's senior leadership team and cabinet, thus ensuring the council achieve best value for the public funds.

Dorset Council will lead the appraisal and OBC stage under the project governance arrangements set out in the Management Case. Risk allocation for future stages will be set out in legal agreements detailing how the Environment Agency, Dorset Council and other funding partners will work together and share the financial and other risks. The agreement will be approved by the Project Board.

4.1.2 Procurement route and timescales

The project will be delivered in conjunction with Dorset Council's Procurement Team to deliver best value and legally compliant procurements.

Dorset Council use the ProContract eTendering solution provided by Proactis via Supplying the South West. This supports all procurement activities above £100,000 and activities covered by the Public Contract Regulations 2015 (HM Government, 2015).

Dorset Council publish details of all opportunities with a contract value over £100,000 via 'Contracts Finder'. This is a free service for businesses, government buyers and the general public. The Council will also publish an award notice on 'Contracts Finder' once the contract has been awarded.

Contracts exceeding the PCR thresholds are also subject to a compliant process, meeting the Public Contract Regulations 2015 (HM Government, 2015), following all timescales as laid down in the regulations. Such contracts will be advertised via Find a Tender and Suppliers will receive email alerts on existing or new opportunities via this service. An award notice will also be published on Find a tender following contract award.

4.2 Efficiencies and commercial arrangements

Efficiencies have been identified and realised to date through the collaborative delivery of the SOC. The Environment Agency's Combined Efficiency Reporting Tool (CERT) (Environment Agency, 2017), is being used for the scheme and will continue to be used for future stages of the FCRM scheme and will be reviewed on a monthly basis. Efficiencies of between 10% and 15% will be sought, to contribute to national targets.

With other regeneration and water side projects in the area being developed for Dorset Council, opportunities for efficiencies through joint delivery will be considered. This will also include seeking opportunities to work with other organisations planning to deliver works in the area. Not only is this relevant for the appraisal and design phases, but also in construction, since combined contracts would allow for significant savings on procurement and mobilisation.

Efficiency opportunities will be considered and presented in more detail at the OBC stage.

Financial Case

How will the scheme be funded?

5.0 Financial Case

5.1 Summary of financial appraisal

The capital costs for each of the interventions to deliver the FCRM scheme's adaptive pathway were calculated using the rates provided in the Environment Agency's 'Long-Term Costing Tool' (Environment Agency, 2015a).

This provides unit costs for FCRM measures based on previously undertaken schemes. The rates within the tool were uplifted to PV using the Consumer Price Index (CPI).

A number of variations for costing options were undertaken to provide a sensitivity analysis around potential cost estimates. These include simple or defined approaches with lower, average and upper percentiles. Further detail on this approach can be found in Appendix B – Financial Case Technical Note.

Cost outputs from the Environment Agency's 'Long-Term Costing Tool' (Environment Agency, 2015a) have been benchmarked and validated against recent works at 'Wall D' of Weymouth Harbour. Good correlation was found, adding to the confidence of the cost assessment, and is considered robust for this stage of the FCRM schemes development.

Maintenance costs have been considered to ensure whole life costs are inclusive of routine repairs and inspections. They have been conservatively determined using the Environment Agency 'Long Term Cost Tool' (Environment Agency, 2015a) and contractor supplied data.

Professional fees and survey costs have been derived by the Project Team using assessment of recent similar work type costs.

In line with Green Book supplementary guidance: optimism bias guidance (HM Treasury, 2013) and FCRM industry best practice, an 'Optimism Bias' uplift of 60% (apart from OBC development costs where 30% has been applied) has been added to all costs which is considered appropriate use during this SOC stage of the FCRM scheme. A summary of the estimated FCRM scheme whole life cash cost is presented in Table 11, where cash cost represents the estimated cost at any given point today and/ or in the future.

Table 11: Summary of FCRM Scheme Whole-life Cash Cost

	Cost Heading	**Whole-life <u>cash</u> cost (to nearest £m)**
Phase 1 (2020-2040)	Lead-in & Construction	£29m
	Operation & Maintenance	£1m
	Optimism Bias	£17m

	Cost Heading	Whole-life cash cost (to nearest £m)
Phase 2 (2040-2060)	Lead-in & Construction	£5m
	Operation & Maintenance	£1m
	Optimism Bias	£3m
Phase 3+ (2060-2120)	Lead-in & Construction	£32m
	Operation & Maintenance	£5m
	Optimism Bias	£19m
TOTAL		£113m

For the development of the SOC, Dorset Council have contributed £50k up to August 2021. An estimate of required costs for the OBC development of the FCRM scheme are presented in Table 12 which relates to value of approval being sought as part of this SOC. Dorset Council have committed to fund the OBC and funds are not being sought from the Environment Agency.

Table 12: Estimate of FCRM scheme OBC costs

OBC Section	Assumptions	OBC Estimate (£k)
Flood Modelling	Collation of existing models and initial gap analysis. Improvements in representation of combined probabilities of tidal and fluvial flooding and consideration of surface water risks. Application of latest UK CP18 climate change scenarios and sensitivity testing for alternative FCRM scheme interventions (e.g. tidal barrier), modelling should also look at optimised timing of scheme interventions. Potential modelling efficiency to link to Dorset's strategic flood risk assessment Level 2 requirements and potentially the Wessex Water's drainage and wastewater management plan.	£100k
Engineering Site Investigation & Surveys	Gap analysis to identify proportionate surveys sufficient for outline design, with consideration of efficiencies for more complete assessments where appropriate. Prioritised surveys are likely to include ground investigation, topographic, bathymetric, statutory undertakers/utilities, UXO etc.	£280k

OBC Section	Assumptions	OBC Estimate (£k)
Reference design – flood & erosion measures	Options assessment and outline design of proposed Weymouth Harbour wall replacements, esplanade and sea wall interventions, preliminary barrier design considerations and other interventions including beach management and surface water drainage.	£200k
Reference design – public realm	To enhance from consentable scheme only, through to high value public realm with consideration of public use/ access requirements.	£30k
Early Supplier Engagement and Early Contractor Involvement	To enhance cost certainty.	£25k
Stakeholder liaison	Significant engagement with Dorset Coast Forum to lead to strengthen support of the FCRM scheme.	£45k
Environmental assessment, investigation & surveys	Data reviewing, programming future surveys (eg benthic), statutory meetings, EIA Screening & Scoping, HRA, WFD, MMO, heritage development to inform proposed FCRM scheme option selections.	£160k
Funding strategy/ negotiations	Financial case development, liaison with funding partners, agreements, viability assessments etc to refine cost and delivery certainty.	£40k
Broader Economic Assessment	Economic case development to include refinement of Recreational Gains & Losses related to amenity/tourism valuations. In addition, consideration of wider economic consequence, supporting economic resilience, and the unlocking of Weymouth's economic potential.	£60k
Legal agreements	Harbour and landowners to gain FCRM scheme support.	£40k
Dorset Council & Support Staff Costs	In-house and external specialist resource.	£150k
OBC Production	Including supporting studies e.g. Carbon appraisal, residual uncertainty etc.	£100k
Risk	30% Optimism Bias applied to lead-in costs.	£370k
	TOTAL	£1,600k

5.2 Funding sources

5.2.1 Funding – Introduction

It is anticipated that significant funding will be forthcoming from Flood Defence Grant-in-Aid (FDGiA). The recommendations relevant to Weymouth from the approved South Devon and Dorset Shoreline Management Plan (SMP) 2 will be delivered by this project.

Flood and coastal erosion resilience partnership funding or 'partnership funding' aims to share the costs between national and local sources of funding for worthwhile projects (where benefits are greater than costs).

The success of this approach depends on:

- creating strong partnerships;
- clearly defining roles for responsible organisations and their partners; and
- securing and managing contributions to help reduce flood and coastal erosion risks and achieve more benefits for the economy, local people and the environment.

It is a current condition from Defra that the Government's FDGiA funding settlement will realise a minimum of 15% 'Partnership Funding' contributions to its overall FCRM capital investment programme.

In addition, the current rationale is that those that are set to benefit from FDGiA scheme investment should likewise contribute to scheme cost. Contributions are considered from all groups and organisations that will benefit the most from the project. Private or third sector contributors (voluntary organisations) are encouraged, as this reduces the amount of funding needed from other local government spending.

Accordingly, the Grant Memorandum (Environment Agency, 2018) for Local Authorities sets out the prerequisite to secure reliable commitments from funding partners.

The Partnership Funding Calculator tool (Environment Agency and Department for Environment, Food & Rural Affairs, 2020b), is used to work out the amount of FDGiA a project is entitled to and the minimum amount of contribution it needs to obtain.

5.2.2 Funding – Specifics

Contributions – Identified in principle

Dorset Council is anticipating being a significant contributor in the development and delivery of this FCRM scheme. For example, the Weymouth Harbour wall component identified under zone 4 (outer harbour) has wider benefits for the Council and therefore Dorset Council's contribution should be at least equal or exceed the capital construction cost of these assets in addition to the routine maintenance costs that are usually incurred directly. In addition, Dorset Council are a notable landowner around the inner harbour (for example; former Council Office Site) and as such have a vested interest in unlocking future development opportunities.

It is highly likely that existing harbour wall replacements and/or repair interventions will be required ahead of OBC approval, given the current poor condition of a number of assets. In addition, opportunistic wall replacements may be possible to align with other local development schemes, ahead of programme but offering significant financial and operational efficiencies. It is therefore assumed that any early Dorset Council investment made from the point of SOC technical assurance onwards, can be recognised as a committed Local Authority partnership funding contribution to the wider scheme.

Future costs for maintenance of the assets will also be borne by Dorset Council and are equivalent to c. £7m in cash terms over the 100-year appraisal period and a PVc of c.£1.7m. Future maintenance for a Risk Management Authority (RMA)-led project receives no Grant-in-Aid eligibility in accordance with the specified methodology.

Dorset Council has recognised the need for flood and coastal defence investment and mechanisms are already in place for collecting and contributing to projects such as this. One such example is the Council's Community Infrastructure Levy (CIL) which collects money as a result of new development, with 40% of the CIL receipts being allocated to Flood Mitigation and Coast Protection in the Weymouth area (Dorset Council, 2019).

Contributions – To be secured

The significant value of tourism and amenity benefit realised locally from Weymouth Harbour and Esplanade works would also support the need for investment by Dorset Council or other major beneficences.

Placemaking enhancements, including amenity or public realm enhancement, may not be required for a consentable FCRM scheme and as such are not eligible for FCRM GiA. Therefore, such enhancements are likely to need to secure alternative funding arrangements.

A Local Levy contribution will be sought from the Wessex Regional Flood & Coastal Committee (WRFCC). The Local Levy is a locally raised source of income used to support the WRFCC, in funding contributions to FCRM projects and initiatives.

Weymouth remains a priority location for support within the WRFCC current committee strategy.

Wessex Water (as the local water company) are a defined Risk Management Authority and have a responsibility for managing risk of flooding via the water and sewage network. The management of coastal and fluvial flood risk is intricately linked to flood risk via the drainage / sewer network as Weymouth can face tide locking, pumping issues and sewer capacity issues associated to wave overtopping. As such Wessex Water are identified as a potential funding contributor and further discussions are planned, noting that water company investment cycles often require long lead-in times to gain funding commitments. In addition, work in conjunction with Wessex Water will be required to develop integrated modelling which can support both OBC development and Strategic Flood Risk Assessment (SFRA) updated for Weymouth.

There are many other potential funders which will be explored in greater detail in the next stage of FCRM scheme development through the production of a detailed funding strategy during the OBC. Other funders could include:

- Weymouth Town Council,
- Network Rail,
- train service operators,
- bus service operators,
- utility statutory undertakers (including BT, Southern Gas Network, Scottish & Southern Power Distribution etc),
- local businesses,
- private developers / landowners,
- charitable organisations (including the Royal Society for the Protection of Birds),
- non-departmental public body (including Historic England and Natural England), and
- harbour users (including the marina, charter boats, visiting craft, events – Seafood Festival etc).

It is anticipated that opportunities may arise for interventions to be made outside of, or not in accordance with the overall strategic pathway. For example, if a harbourside development came forward, planning a wall replacement ahead of any planned scheme intervention, it may be prudent to secure opportunistic improvement or combine objectives.

It is hoped that such interventions could be acknowledged by and feature as potential partnership funding contributions to the overall scheme.

5.2.3 Funding – Partnership Funding Calculator

A Partnership Funding Calculator (Environment Agency and Department for Environment, Food & Rural Affairs, 2020b) has been completed and is included as Appendix D. This calculator has assumed that Phase 1 and 2 capital sums seek approval in one singular application. The raw Partnership Funding Score is 79% and the adjusted Partnership Funding Score is 100%.

It should be noted that the PF Calculator has presented all values respective to a duration of benefits period of 50 years. This is the timespan before the next major capital investment is proposed (e.g. a major investment being more than 20% of the value of the investment being considered today in today's prices, without inflation added). The investment made in 2071 (Year 50) is anticipated to exceed a cash value of >£50m hence the curtailment in the duration of benefits to 50 years.

Whilst the adjusted PF Score is only marginally above 100%, it does indicate that investment to further refine and develop the scheme understanding is worthwhile. There is obviously risk that any change to benefits or costs could lead to a funding shortfall, and a below 100% score which would in turn require further funding contributions to be secured.

Table 13: Sources of Funding

Scheme Sources of Funding	100 Year Present Value £m Commitment	50 Year Present Value £m Commitment
Environment Agency contribution (Grant in Aid)	TBC £38m+	TBC £31m+
Local Levy	TBC £3m+?	TBC £1m+?
Dorset Council Contributions	TBC £12m+?	TBC £8m+?
Other Contributions	TBC	TBC
Total funding	TBC £52m+	TBC £40m+

Table 14: Partnership Funding Score (50year Duration of Benefit)

	%
Raw Partnership Funding score	78%
Adjusted Partnership Funding score	102%

5.3 Expenditure and income profile

Table 15: OBC Stage Expenditure Profile

Income and Expenditure streams £k	2021	2022	2023	Total
Cost less contingency	200k	630k	400k	1,230k
Contingency	60k	190k	120k	370k
Total cost	260k	820k	520k	1,600k
Grant in aid	0	0	0	0
Contribution	260k	820k	520k	1,600k

Management Case

How will the scheme be managed?

6.0 Management Case

6.1 Project management

The scheme is being efficiently and effectively project managed in accordance with Dorset Council's project management processes. Professional support is provided at this SOC stage by consultant, WSP UK Ltd, operating under rigid technical and quality assurance procedures as part of an integrated business management system. The nature and operation of the Dorset Council/WSP UK Ltd relationship allows full and seamless integration of team members from both organisations to best utilise capabilities and capacity. A similar arrangement will be taken into subsequent stages of the FCRM scheme development and delivery, with Dorset Council working closely with external consultants and contractors.

All stakeholder engagement for the FCRM scheme is managed by Dorset Council, supported by the Dorset Coast Forum and guided by a live stakeholder engagement plan. Key consultees are the Dorset Council Harbours Committee, Weymouth Town Council, the Environment Agency, Wessex Water, Natural England, Marine Management Organisation, numerous landowners and multiple service departments within Dorset Council.

6.1.1 Project structure and governance

Dorset Council have put in place a governance structure to define roles and responsibilities, reporting mechanisms and decision-making processes to facilitate project delivery.

The scheme is overseen by a Project Board comprising senior management representation from Dorset Council, the Environment Agency and WSP UK Ltd (as senior supplier for the current SOC stage of the scheme). The Project Board is the overall authority for the FCRM scheme and is accountable for its success or failure. The individual members of the Project Board have sufficient authority to carry out their responsibilities effectively. The Project Board has met quarterly through the development of this SOC, providing direction and guidance to the Project Delivery Team.

Operating beneath the Project Board is the Project Delivery Team who are responsible for project delivery and implementation. The Project Delivery Team comprises the Dorset Council Project Manager, Assistant Project Manager, Engineering Projects Manager; the Environment Agency Wessex Area Coastal Engineer; and the WSP UK Ltd Supplier Project Manager. This team have met monthly through the development of this SOC.

Dorset Council are the lead delivery and contracting body on behalf of the partners involved in the project. Dorset Council have access to a full range of supporting

and complementary services from WSP UK Ltd, which have been utilised in development of this SOC.

6.1.2 Project roles and responsibilities

The main roles and responsibilities for the scheme are detailed in Table 16.

Table 16: Project Roles & Responsibilities (as currently defined for this SOC stage)

Project Role	Responsibility	Team Member (for SOC Stage)	Job Title	Participation
Project Sponsor (SRO)	Sets strategic direction for the project – Enable linkage between the top level strategic direction of the organisation and the management activities required to achieve strategic objectives. (Both project delivery and asset operation/ inspection/ maintenance all sit within the portfolio of the Dorset Council Sponsor).	Dave Thompson	Corporate Director for Property and Assets, Dorset Council	Project Board
Project Executive	Accountable for the project – ensures that the scheme remains focussed on achieving its objective and delivering to realise the projected benefits.	Sarah Cairns	Service Manager – Major Projects, Dorset Council	Project Board
Project Manager	Responsible for delivering the project – runs the project on a day-to-day basis on behalf of the Project Board.	Alan Frampton	Strategy & Policy Manager at BCP Council, Working on behalf of Dorset Council	Project Board & Delivery Team
Assistant Project Manager	Supports project manager in running project on day-to-day basis.	Rob Thomas	FCRM Project Engineer, Dorset Council	Project Board & Delivery Team
Supplier WSP Project Manager	Responsible for coordination of WSP delivery and for achieving required standards of quality within the specified constraints of time and cost.	Ben Murray	Associate Director (Water Risk Management and Engineering), WSP UK Ltd	Project Board & Delivery Team

Project Role	Responsibility	Team Member (for SOC Stage)	Job Title	Participation
Senior User – Dorset Council FCRM	Responsible for ensuring the project meets the requirements of the end user.	Matt Penny	Lead Manager – Flood & Coastal Erosion Risk Management, Dorset Council	Project Board & Delivery Team
Senior User – Dorset Council Harbours	Responsible for ensuring the project meets the requirements of the end user.	Ken Buchan	Head of Environment & Wellbeing, Dorset Council	Project Board
Senior User – Environment Agency Wessex Area	Responsible for ensuring correct linkage and consideration of the EA's Strategic Overview role and for monitoring/claiming of OM's.	Ron Curtis / Matt Akers	Area Flood Risk Management, Wessex EA	Project Board
Senior Advisor – Environment Agency Wessex Area	Responsible for ensuring correct linkage and consideration of the EA's Strategic Overview role and for monitoring/claiming of OM's.	Dave Picksley	Coastal Engineer, Wessex EA	Project Board & Delivery Team
Senior Advisor – Dorset Council Finance	Advises on financial matters relating to project proposals.	Paul Ackrill	Finance Advisor / Place Business Partner, Dorset Council	Project Board
Senior Advisor – Dorset Council Comms	Advises on project communications and engagement.	James Potten	Communications Business Partner – Place, Dorset Council	Project Board
Senior Advisor – Dorset Council Legal	Advises on legal matters relating to project proposals.	Hannah Massey	Lawyer – Regulatory, Dorset Council	Project Board

Project Role	Responsibility	Team Member (for SOC Stage)	Job Title	Participation
Senior Supplier	Responsible for the technical integrity of the elements of the project under their commissions.	Hamish Hall	Director, Water – Head of Profession, WSP UK Ltd	Project Board

6.2 Schedule

The project schedule is a living document and will be re-visited as the FCRM scheme progresses. The key milestones are listed in Table 17.

Table 17: FCRM Scheme Outline Programme Milestones

Activity	Date
Strategic Outline Case – Submit to LPRG	July 2021
Strategic Outline Case – Approval	September 2021
Award Outline Business Case/appraisal tender package (appoint Consultant & Early Contract Involvement (ECI) Supplier)	Autumn 2021
Outline Business Case development	2021 – 2023
Outline Business Case – Submit to LPRG	March 2023
Outline Business Case – Approval	April 2023
Detailed Design & Consents	Spring 2023 – Summer 2024
Construction Start – Initial Phases	Autumn 2024
Construction End – Initial Phases	2040

6.3 Outcomes/Benefits

A Benefits Realisation Plan covering what benefits are to be measured will be developed in the next stage (OBC) of the FCRM scheme. This will state who is accountable for the expected benefits, how and when achievement of expected benefits will be measured and what resources are needed to carry out the work. The Project Manager will work closely with the Project Board to profile anticipated benefits.

The primary benefit of the scheme is to significantly reduce the risk of flooding and coastal erosion to the town of Weymouth, thereby realising c.£470m of PV economic benefit (100yr appraisal period). Whilst the economic benefit is very large, the principal reportable metrics for the Environment Agency concerns the number of ‘at-risk’ households moved to a lower risk category as identified as Outcome Measures 2A, 2B and 3.

Careful consideration of how to claim and release Outcome Measures will need to be undertaken, whether through ‘flood cell’ style benefit assignment, intervention benefit apportionment or upon individual phase completion for example.

Table 18 Outcome Measures delivered by the FCRM Scheme

Guidance Ref	Outcome Measures	Value
4.1	Ratio of whole-life benefits to whole life costs over the duration of benefits period.	9 : 1

Guidance Ref	Outcome Measures	Value
4.2	OM 1A – Qualifying benefits over the appraisal period (PVb taken from table 2)	c.£470m
4.4	OM 1B - benefits to people that are not associated with avoiding household damages, eg, less stress/risk to life.	c.£30m
4.5	Duration of benefit period (not the appraisal period)	50yrs
5.2	OM 2A – Households at risk of flooding before the investment and which are going to benefit from a reduction in flood risk at the end of the duration of benefits period (households at risk today)	1,036
5.3	OM2B – Additional households that are at risk from the impacts of climate change before 2040	72
6.1.1	OM 3 – Households at risk of loss in the medium term	57
6.1.1	OM 3 – Households at risk of loss in the longer term	109
7.2	OM 4A – Habitat created or improved (ha)	0
7.3	OM 4B – Rivers enhanced – river habitats and natural processes restored and enhanced (km)	0

6.4 Risk management

The key project risks, risk owners and the proposed mitigation measures for each are summarised earlier in this report in Table 4. The scheme risks are assessed in further detail in the risk register included as Appendix E. This will be further developed in subsequent stages of FCRM scheme development.

Day to day management of risk is undertaken by the Delivery Team while strategic risk management is undertaken by the Project Board. The Project Board receives risk reports from the project team and provides review and input into identification and management of risk.

Optimism bias at this stage of FCRM scheme development has been set at 60% on all costs, in accordance with FCERM-AG and related guidance.

6.5 Assurance

Project assurance of the SOC has been provided by peer reviews from key representatives integrated into the Delivery Team. These include Engineering, Legal, Finance, Procurement and Communications professionals.

Assurance of the SOC delivery has been carried out by the Project Board which will continue for the future phases of the FCRM scheme.

The Project Executive is ultimately accountable for the delivery of the project in accordance with the requirements of the Project Board and Full Council. This role will be supported by an integrated delivery team resourced from specialist departments within Dorset Council and external resources as required.

The ratification of and decision to submit this SOC was made at Dorset Council's Cabinet on 22/06/21.

Assurance of the decision to progress to OBC development is sought via submission of this SOC to the EA's Large Projects Review Group (LPRG).

6.6 Engagement with Stakeholders and compliance with the Equality Act 2010

External engagement was carried out through the development of previous studies that led to the preferred strategic adaptive pathway approach set out in the Weymouth Harbour & Esplanade FCRM Strategy (Dorset Council, 2020c), approved by Dorset Council in October 2020. The engagement on those previous studies included consultation with statutory consultees including Historic England, Natural England, the LLFA and the Environment Agency, to obtain EIA scoping opinions on a range of strategic options to help inform selection of the preferred strategic pathway defined in the Weymouth Harbour & Esplanade FCRM (Dorset Council, 2020c).

Continuing engagement will be required during the forthcoming detailed appraisal and option selection during the OBC and future stages of the FCRM scheme. This will include further consultation with statutory consultees, interested parties and the wider public.

At the start of the OBC stage the Dorset Council project team will work with the Dorset Coast Forum (DCF) to develop a Stakeholder Engagement and Communications Plan, which will follow best practice guidance approaches and comply with the requirements of the Equality Act 2010 (NB: an Equalities Impact Assessment (EqIA) will need to be approved by Dorset Council's Equality and Diversity Action Group before proceeding to OBC). DCF are a trusted independent facilitator for projects along the Dorset coast, and their involvement in this stage of the FCRM scheme development will also enable co-ordination of OBC engagement/ communications with other parallel initiatives around Weymouth that DCF are currently leading on, including the Dorset Harbours Strategy and the INTERREG VA France (Channel) England Programme "Building Resilience in Flood-Disadvantaged Communities (BRIC)" project.

The Stakeholder Engagement and Communications Plan will set out the communication aims and objectives and identify an action plan to deliver these. The appraisal consultant will support the stakeholder engagement process by attending key meetings and preparing information, plans and display materials.

It is envisaged that future engagement with the local community will follow the following key stages:

- Raise awareness of the flood and coastal erosion risk.
- Input through consultation at the optioneering stage.
- Engage the public around the emerging preferred option.
- Communicate the decision on the proposed FCRM scheme, and how the consultation has helped to shape this.

We will also provide the local community with regular updates on progress with the FCRM scheme, for example through press releases and regular postings to a dedicated project website.

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List of Abbreviations

AEP	Annual Exceedance Probability
AFCRM	Area Flood and Coastal Risk Manager
AIMS	Asset Information Management System
BCP	Bournemouth, Christchurch And Poole
BCR	Benefit Cost Ratio
BMP	Beach Management Plan
BRIC	Building Resilience in Flood-Disadvantaged Communities
Cap Ex	Capital Expenditure
CDM	Construction Design and Management
CERT	Capital Efficiency Reporting Tool
CIL	Community Infrastructure Levy
CP18 & UKCP18	UK Climate Predictions 2018
CPA	Coast Protection Authority
CPI	Consumer Price Index
CSF	Critical Success Factors
DCF	Dorset Coast Forum
EA	Environment Agency
ECC	Engineering and Construction Contract
ECI	Early Contract Involvement
EIA	Environmental Impact Assessment
FCERM-AG	Flood and Coastal Erosion Risk Management Appraisal Guidance

FCRM	Flood and Coastal Erosion Risk Management
FDGiA & GiA	Flood Defence Grant-In-Aid
GDP	Gross Domestic Product
GIS	Geographic Information System
HM & HMG	Her Majesty's Government
HRA	Habitat Regulation Assessment
HRO	Harbour Revision Order
ILP	Indicative Landscape Plan
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
LPRG	Large Projects Review Group
LTCT	Long Term Cost Tool
MCH	Multi Coloured Handbook
MCM	Multi Coloured Manual
MMO,	Marine Management Organisation
NEC	New Engineering Contract
OBC	Outline Business Case
OD or ODN	Ordnance Datum (Newlyn)
OM	Outcome Measure
Op Ex	Operational Expenditure
PCR	Public Contract Regulations
PEIR	Preliminary Environmental Information Report

PF	Partnership Funding
PID	Procurement Initiation Document
PSC	Professional Services Contract
PSO	Partnerships & Strategic Overview
PV	Present Value
RCP	Representative Concentration Pathways
RFCC	Wessex Regional Flood & Coastal Committee
RMA	Risk Management Authority
RNLI	Royal National Lifeboat Institution
RTL	Risk to Life
SAC	Special Area of Conservation
SFRA	Strategic Flood Risk Assessment
SMP	Shoreline Management Plan

SOC	Strategic Outline Case
SRO	Senior Project Sponsor
SSSI	Site of Special Scientific Interest
TEPS	Transport and Engineering Partnership
TWAO	Transport and Works Act Order
UNESCO	United Nations Educational, Scientific and Cultural Organization
UN SDG	United Nations Sustainable Development Goals
UXO	Unexploded Ordnance
WFD	Water Framework Directive
WPBC,	Weymouth And Portland Borough Council
WRFCC	Wessex Regional Flood & Coastal Committee

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