southsea
COASTAL SCHEME

Science Discovery Group

21st June 2021

Presenters

Rupert Teasdale – Southsea Project Manager

Rupert is a Project Manager and Coastal Engineer within Coastal Partners and is experienced in delivering a wide variety of coastal and marine projects in the UK and Australia. Rupert is currently the clients Project Manager and NEC ECC Project Manager for the Southsea Coastal Scheme.

Thomas Green – Project Manager and Coastal Scientist

Tom is a Project Manager and Coastal Scientist within Royal HaskoningDHV's Water team and has extensive experience in a wide variety of projects from appraisal through to design. Tom is currently responsible for planning and delivering the Southsea Coastal Scheme detailed design on behalf of RHDHV.

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Integrated Delivery Team (IDT)

A single collaborative team of specialists from industry leading partners working to shared objectives.

Objective

To design and build a coastal defence for Southsea that offers **protection from a major flood event**, including the effects of climate change, and that **embraces everything we all love about the seafront.** We will **seize every opportunity** to include efficiencies and **wider enhancements** to ensure we deliver a scheme that offers the **best for Southsea now and for future generations**.

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History

1797- Portsmouth is a small but important coastal town. The area which now forms Southsea is undeveloped and shown as marsh and agriculture.

1856 - Southsea Common is identified on the map at this time, Southsea town centre are starting to take shape.

1889 - Clarence and South Parade piers are shown on the map, and the beginnings of Canoe Lake Park are identifiable.

1938 - The urban area has expanded to fill most of the island, extending along the full length of the southern shoreline.

Present day risk of flooding

- **10,119** residential properties affected
- **4,114** properties at risk of inundation (OM2)
- **16** properties at risk from erosion (OM3)
- **704** commercial properties
- **74** listed structures
- **3** scheduled ancient monuments
- **4** critical access routes

Urgency

Existing low standard of protection (1:20year)

Existing asset at the end of their life (less than 10 years residual life)

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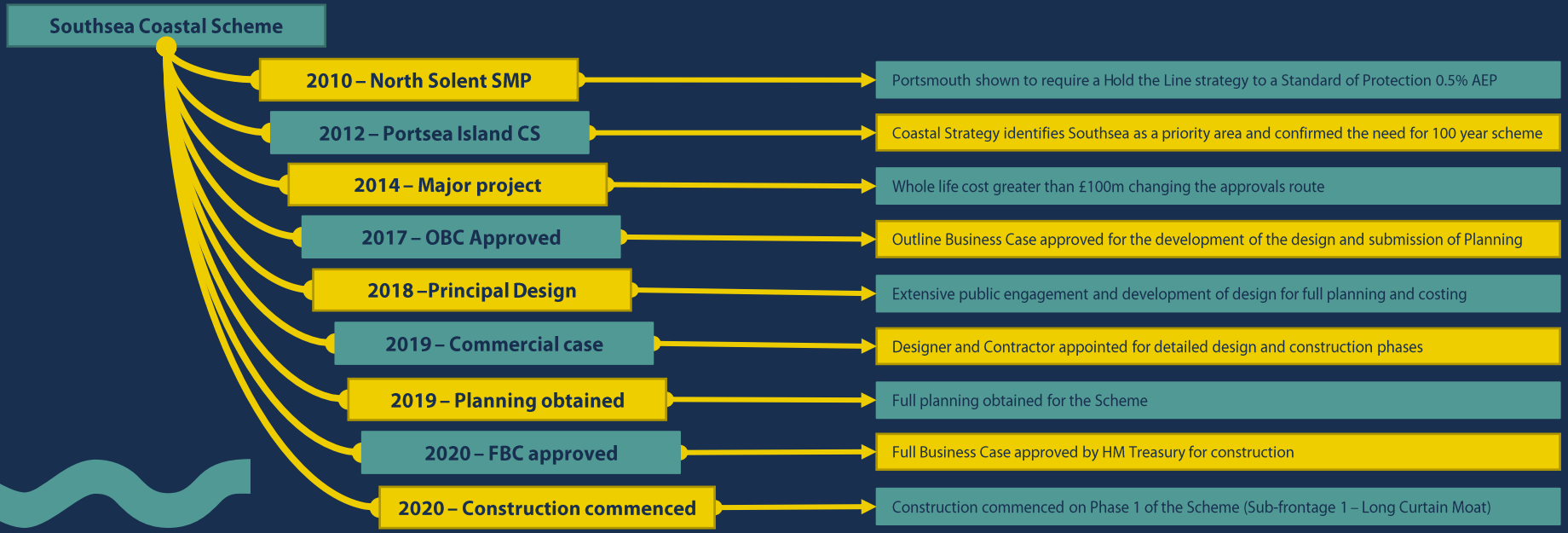
The journey so far…

…from Shoreline Management Plan to now…



The journey so far…

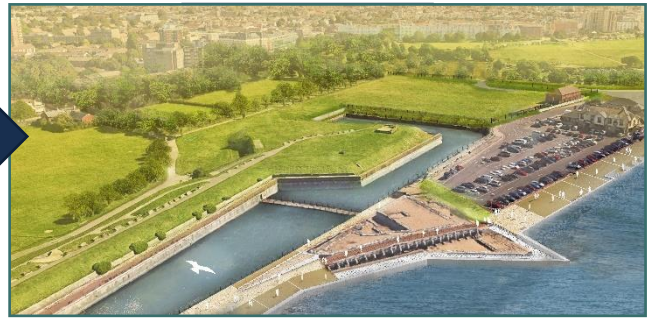
Objectives

- 100 year life
- Min 0.5% AEP
- Including Climate Change
- Protect sea views
- Seek wider benefits
- Enhance where possible
- Maintain amenity and access

Outline Design

- Primary defence
- Secondary set back defence
- Beach Management

Principal Design



Frontage 1: Long Curtain Moat
Primary: Vertical seawall and rock revetment
Secondary: Existing high ground and setback bund

Detailed Design

- Refined design
- Materials specified
- Construction drawings
- Licencing and Consents obtained
- Enhancement and Interpretation

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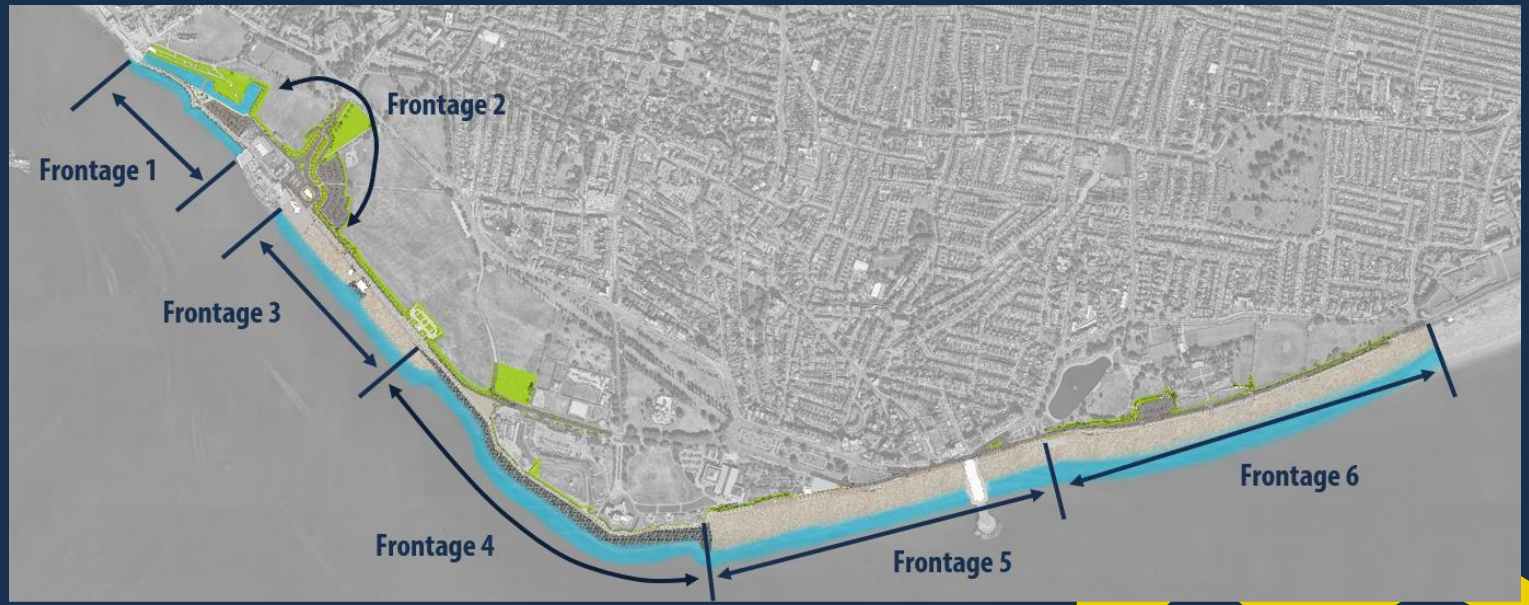
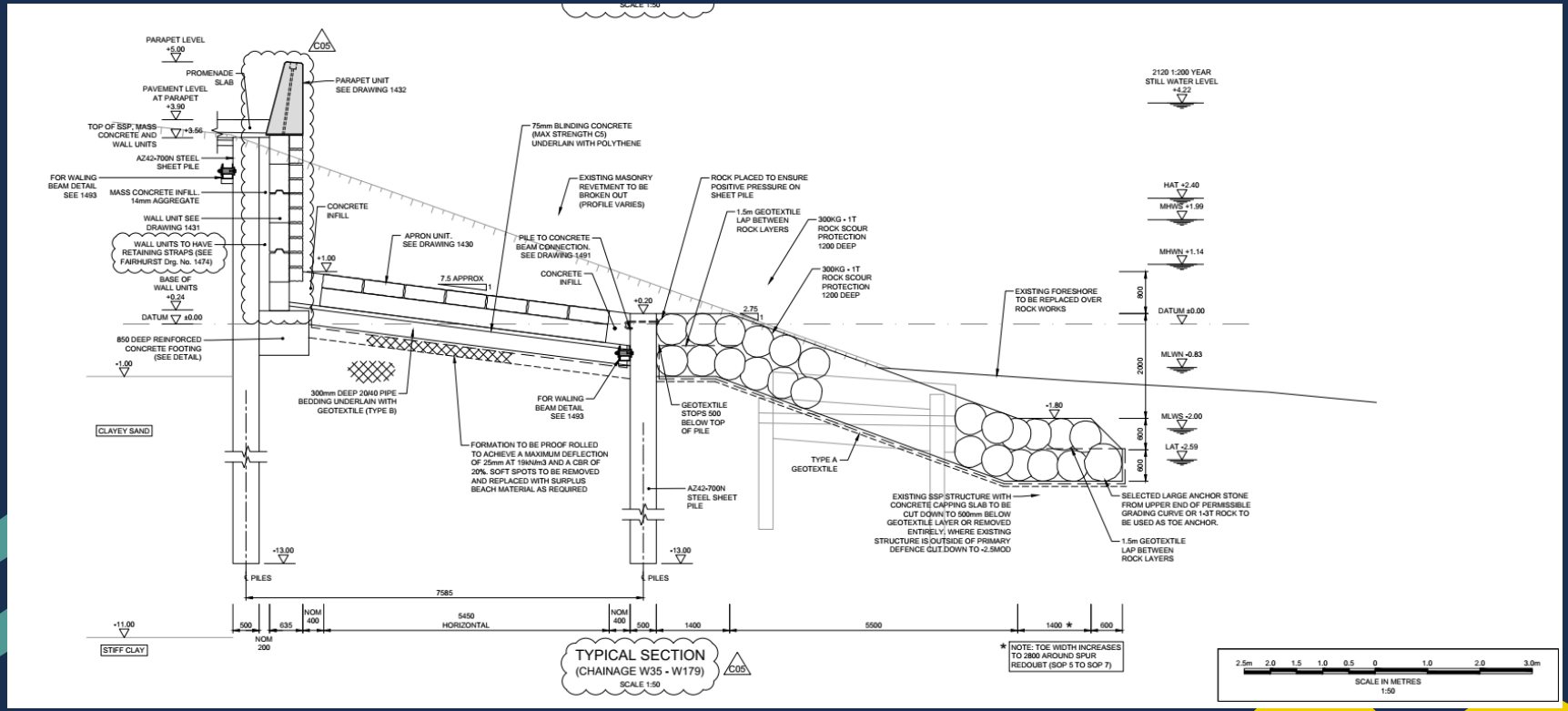
Frontages and phasing

2020-2022	2021-2023	2023-2024	2024-2025	2024-2025	2025-2026
					
F1 - Long Curtain Moat	F4 - Southsea Castle	F3 - Southsea Common	F5 - Pyramids to Pier	F6 - Canoe Lake	F2 - Clarence Pier



Frontage 1 – Long Curtain Moat



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Frontage 1 – Long Curtain Moat

Planned completion August 2022

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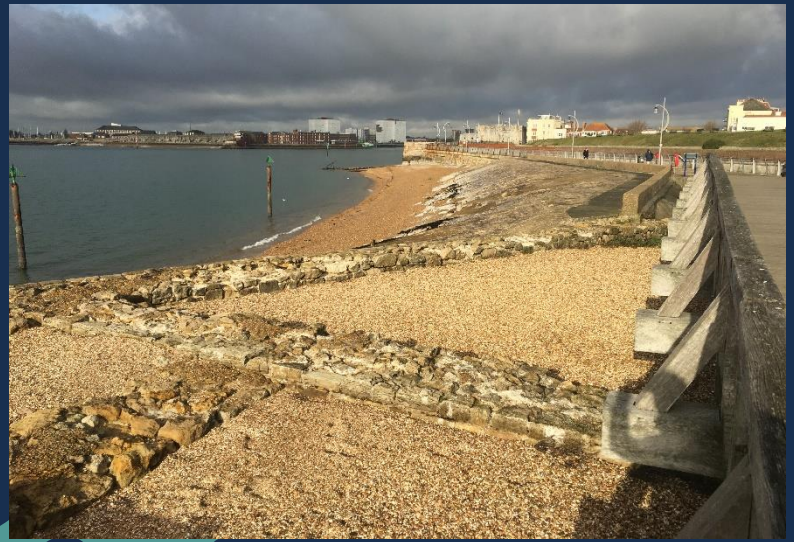
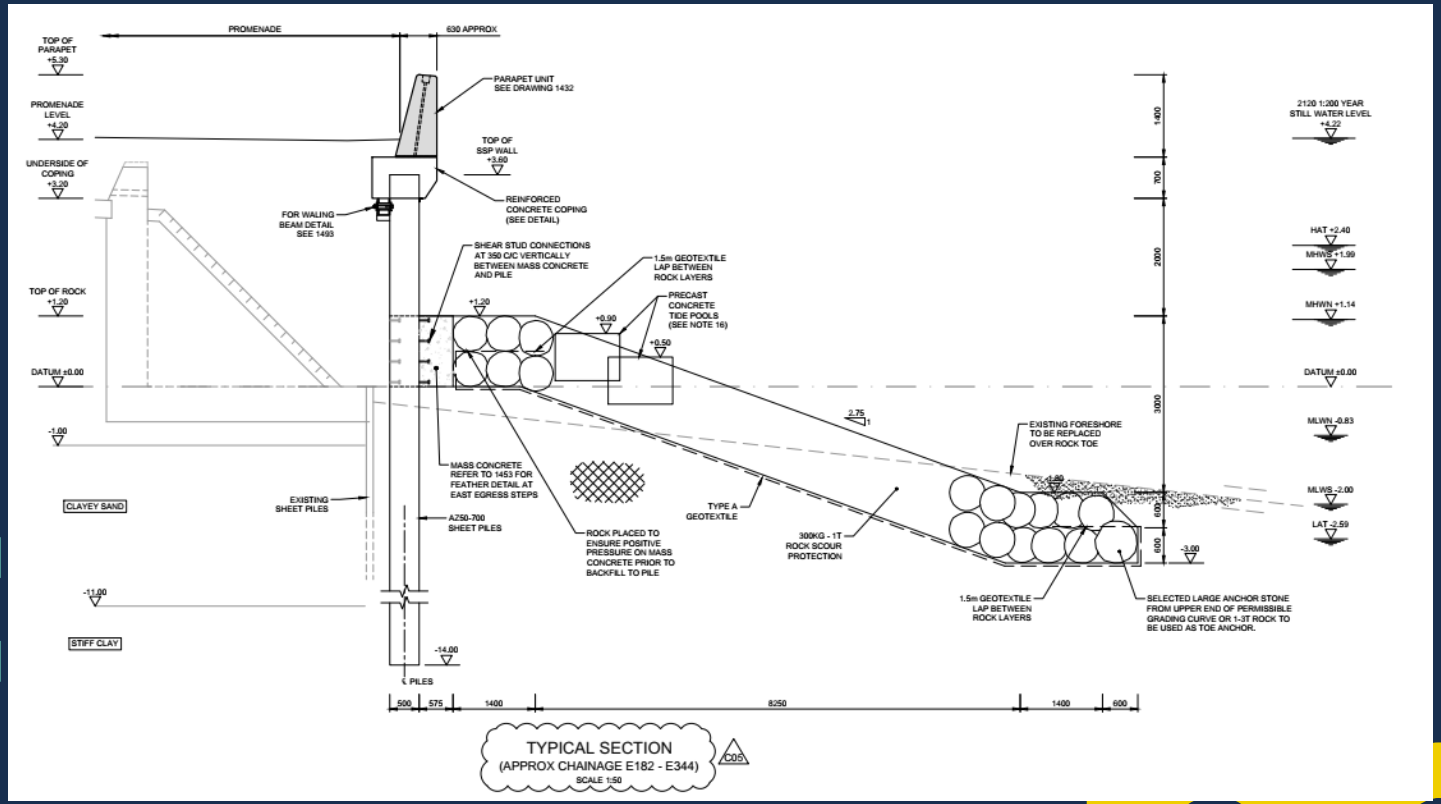
Frontage 1 – Long Curtain Moat

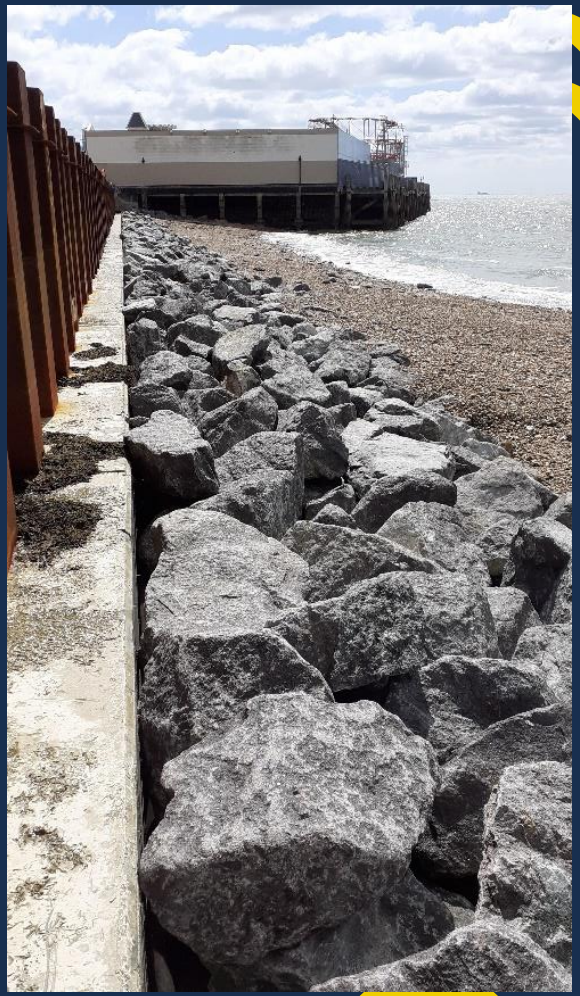


Frontage 1 – Long Curtain Moat



TYPICAL SECTION
(APPROX CHAINAGE E182 - E344)
SCALE 1:50
C05

Frontage 1 – Long Curtain Moat



Frontage 4 detailed design

Principal design

Detailed design

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Frontage 4 detailed design

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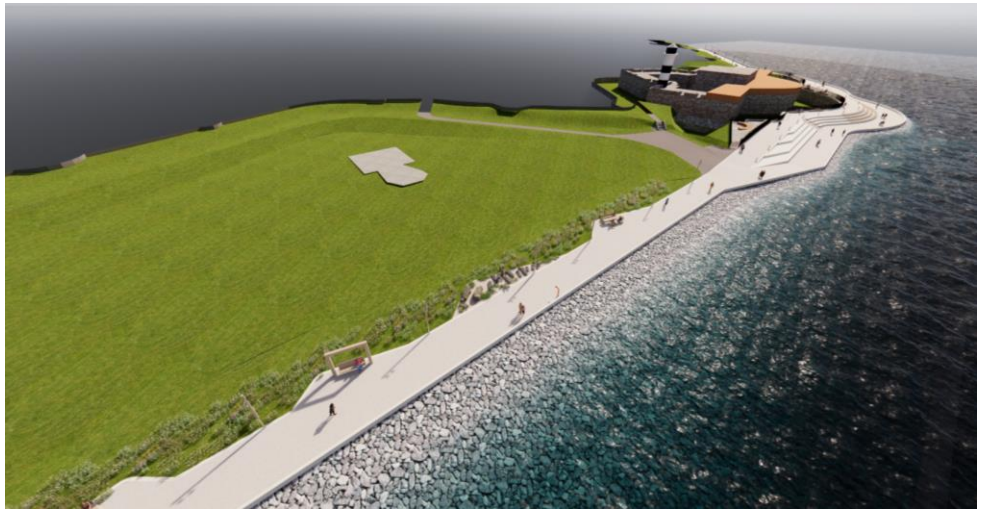
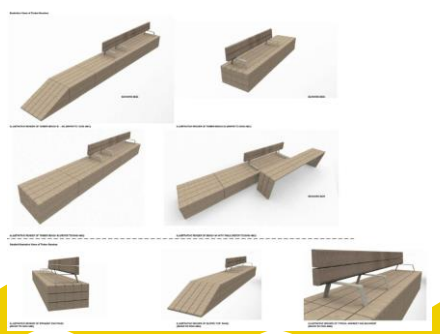
Frontage 4 detailed design





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Design Objectives

- Design and build a coastal defence scheme that offers protection from a major flood event, including the affects of climate change

- Embrace everything we all love about the Seafront

- Seize every opportunity to include wider enhancements to ensure we deliver a scheme that offers the best for Southsea now and for future generations

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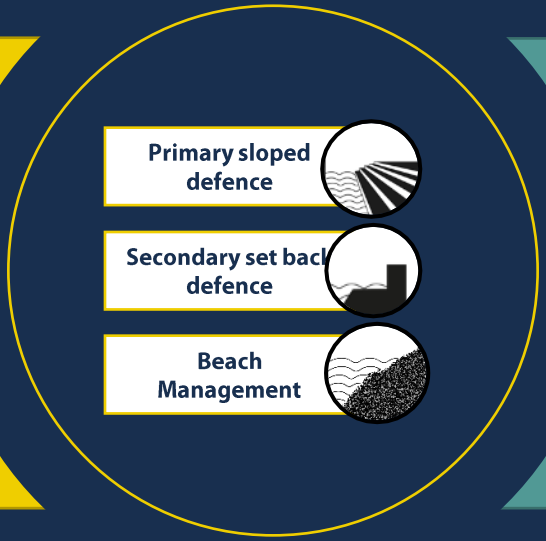
Detailed engineering design

- Site investigation
- Coastal Modelling
- Landscape & Public Realm
- Physical Modelling
- Other: H&S, UXO, Services



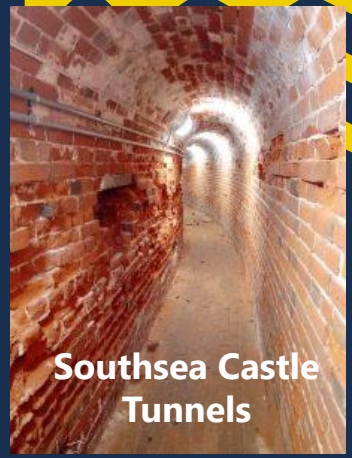
- Statutory Stakeholders
- Public engagement
- Seafront masterplan
- Planning Condition
- Business interfaces

Site Investigations

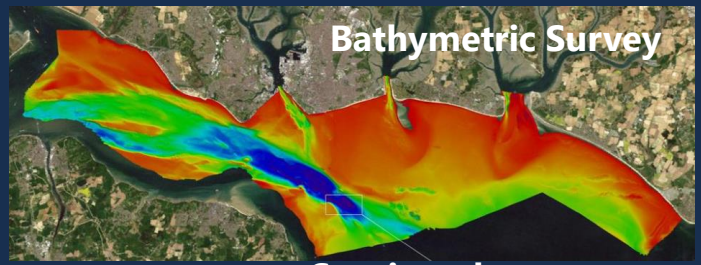
- Review of existing structures
- Building surveys
- Topographic Survey
- Ground investigations (boreholes, trial pits, cores)
- Bathymetric Survey
- Monitoring (ground water, waves etc.)
- Visual Inspection.
- Historic Records (as-built drawings)
- Continued surveys and monitoring

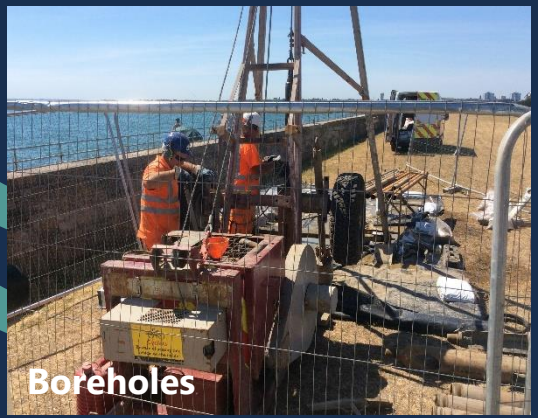

Topographic Survey


Trial Pits


Southsea Castle Tunnels


Historic Records


Bathymetric Survey


Boreholes


Buried Features

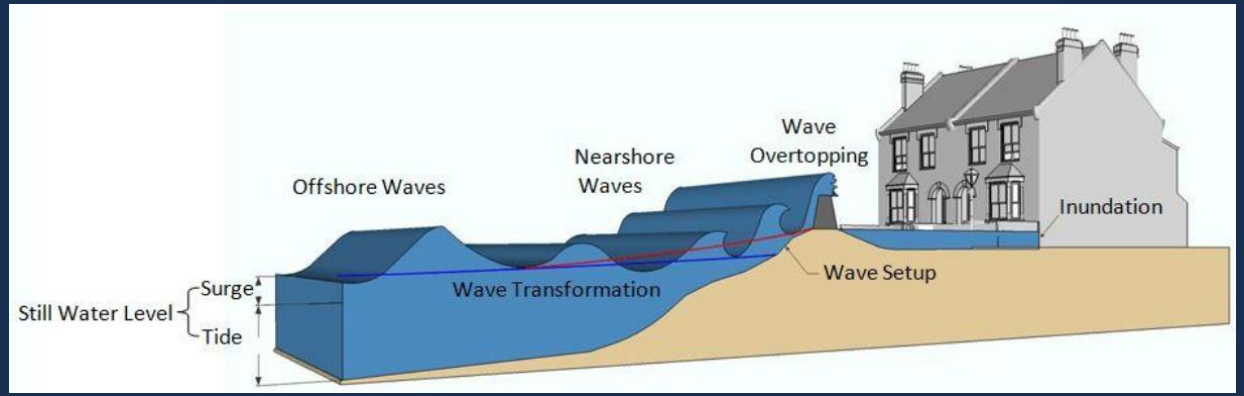
Continued survey and monitoring

Coastal Conditions

…How is this considered in the design of the scheme?

- A staged process is undertaken:

Offshore Coastal Conditions ⇨ **Wave & Sediment Transport Modelling** ⇨ **Wave Overtopping Modelling** ⇨ **Flood Inundation Modelling** ⇨ **Detailed Design**



Stage 1: Offshore Coastal Conditions

Extreme Water Levels
(EA Coastal Flood Boundary Database, 2017)

Relative Mean Sea Level Rise Projections
(UK Climate Change Projections, 2018)

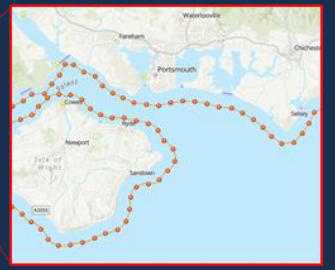
Relative Mean Sea Level Rise projections for Portsmouth

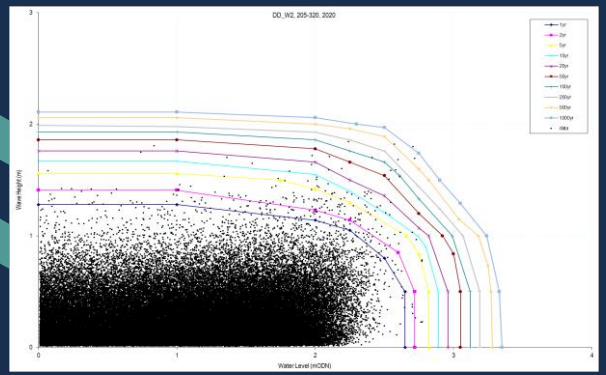
Extreme Wave Height Analysis
(EA Coastal Flood Boundary Database, 2008 or CEFAS Hindcast)

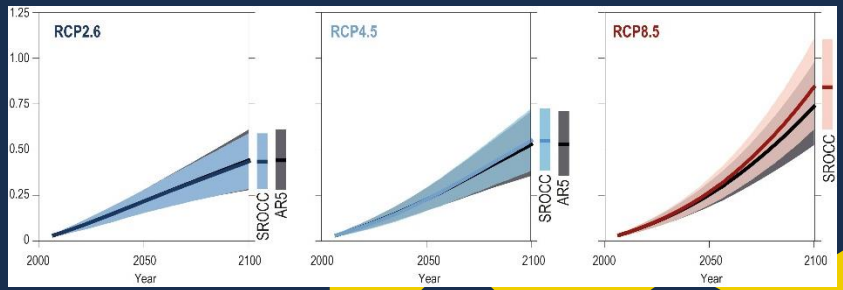
Joint Probability Analysis of Extreme Water Levels & Wave Heights

Set of combined 'offshore' water level and wave height scenarios

Stage 2: Wave Transformation Modelling



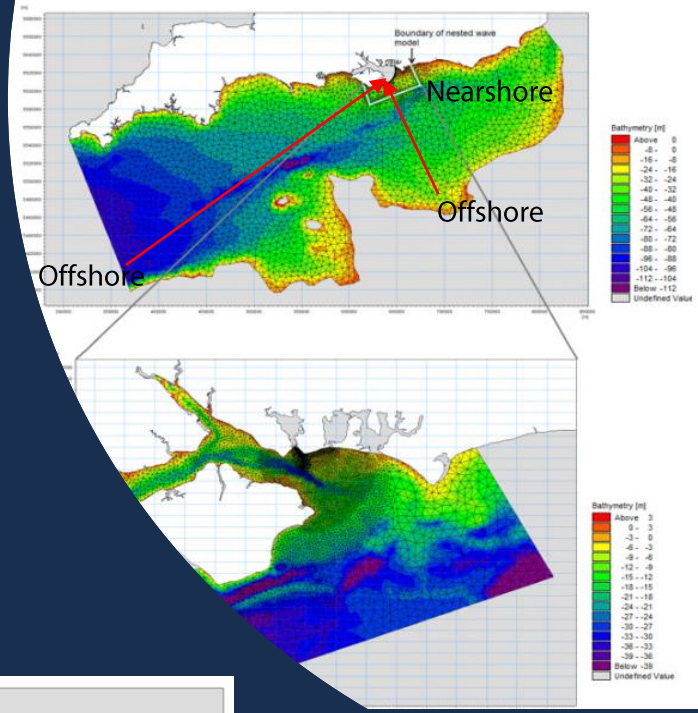


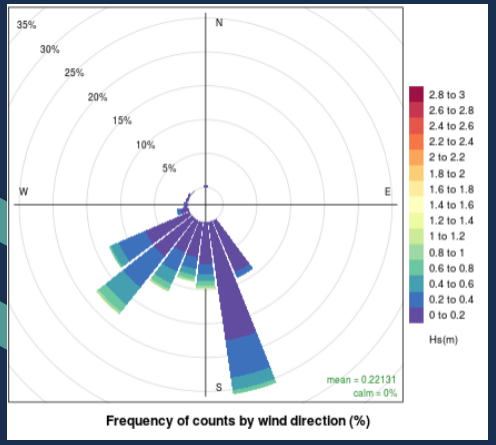


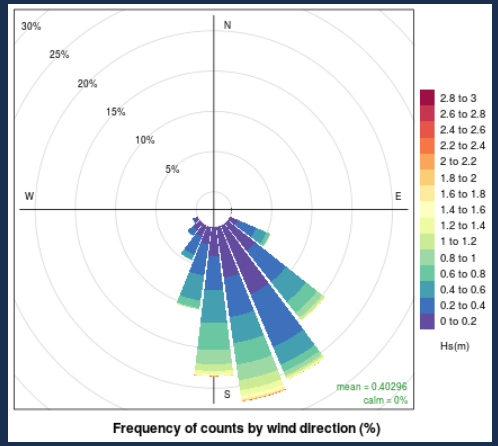
Stage 2: Wave Modelling

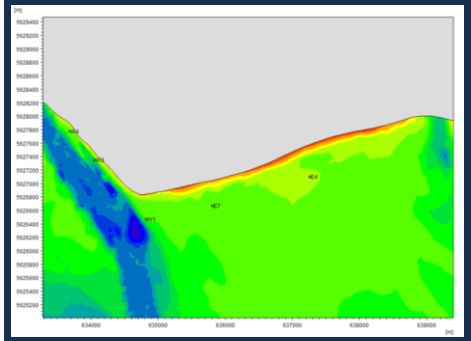
- Wave model is used to transform waves from the ‘offshore’ zone to the ‘nearshore’ zone for use in the design

- Wave climate varies across the frontage



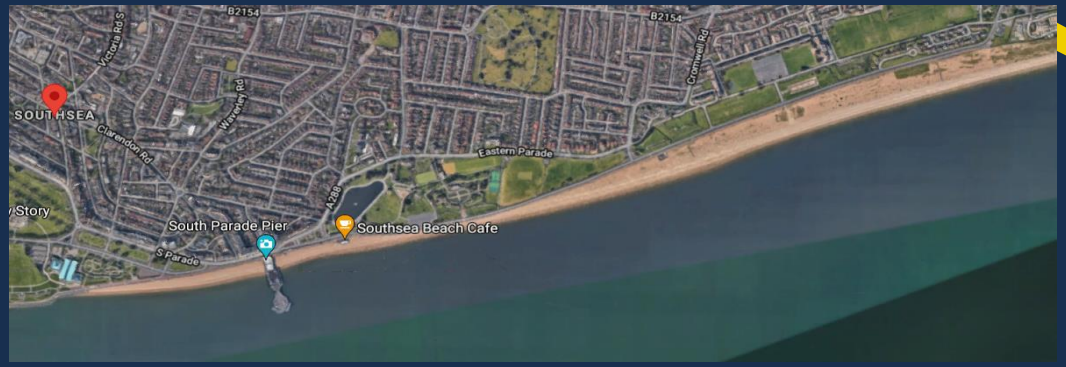


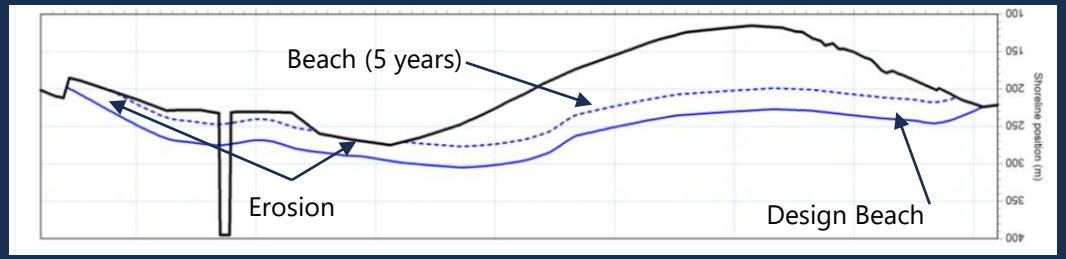




Stage 2: Sediment Transport Modelling

- Sediment transport model is used to design beach management (inc. control structures).



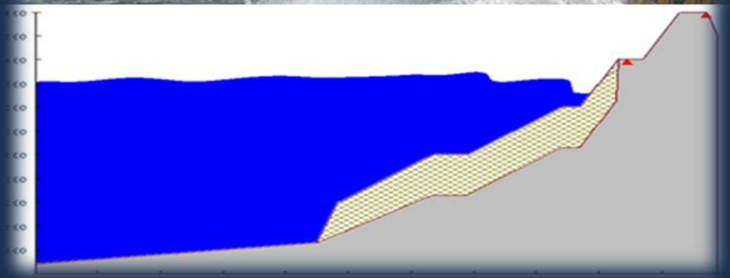


Stage 3: Wave Overtopping and Performance Testing

- Calculations are undertaken to assess the performance (Standard of Protection) of coastal defences

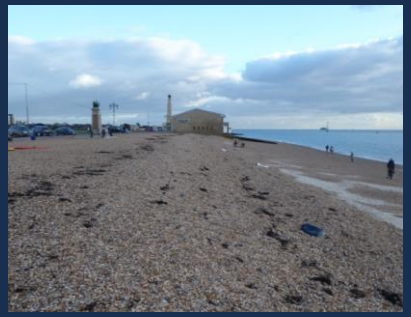
- Standard of Protection is assessed for the following categories
  - Limits to people and vehicles
  - Limits for property behind the defence
  - Limits for wave overtopping for structural design

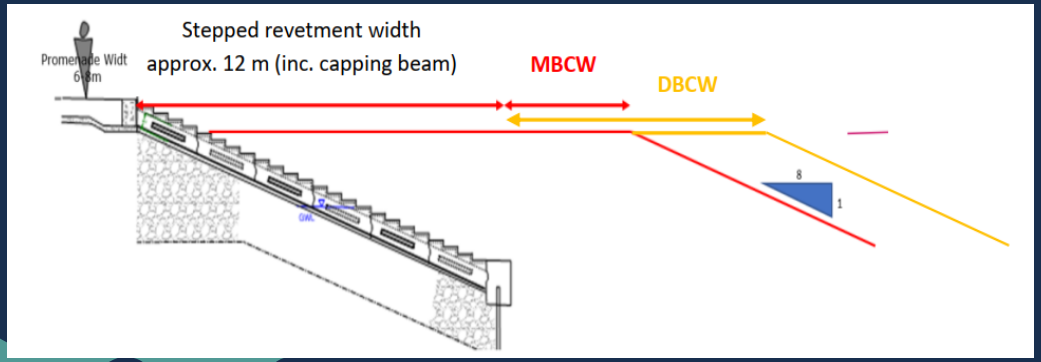
- For Southsea, defence levels are set based on people safety:
  - Primary Defence (promenade): 1l/s/m for an annual storm event
  - Secondary Defence (behind setback defence): 1l/s/m for an extreme 1:200yr event

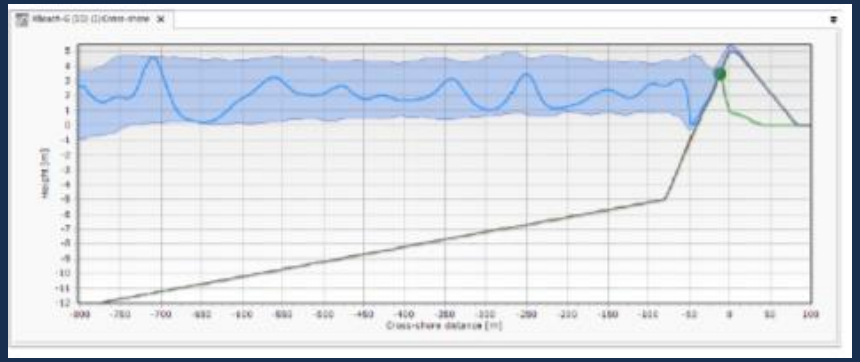


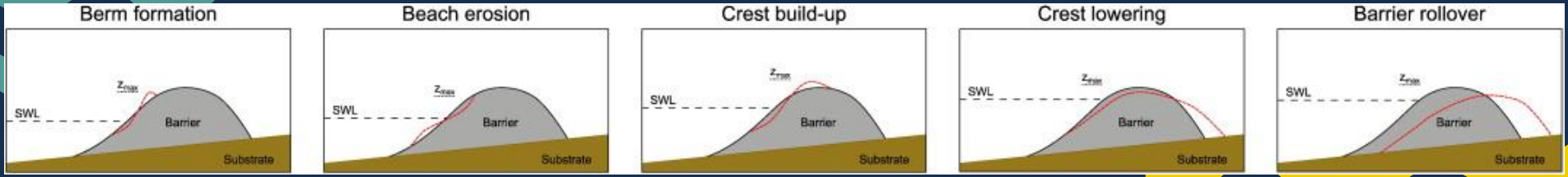
Stage 3: Wave Overtopping and Performance Testing, continued.

- Calculations are undertaken to assess the performance of a beach and to set beach crest widths and levels.









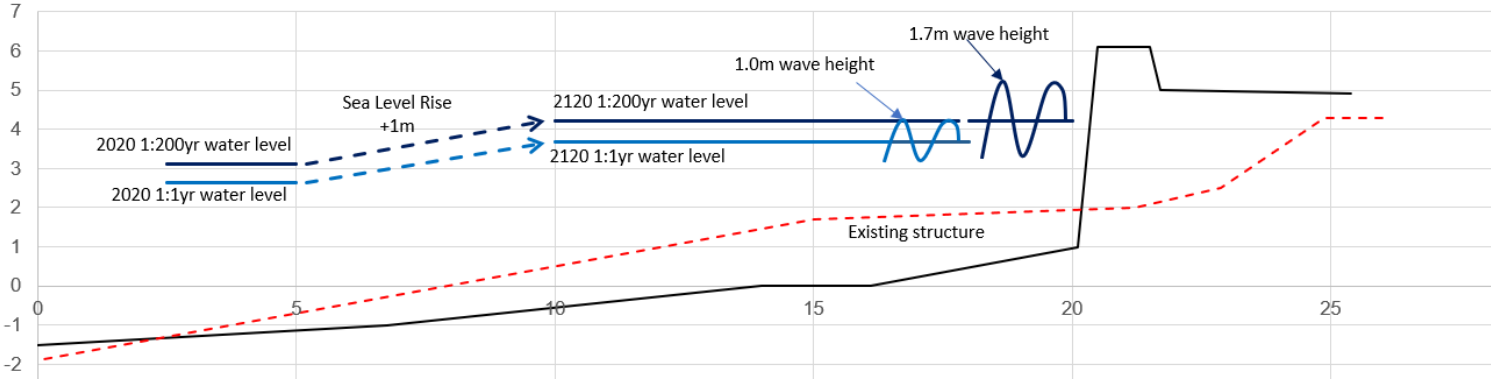
Stage 4: Flood Inundation Modelling

- Inundation models are used to simulate a flood event
- Inputs: wave overtopping and water levels (inc. SLR)
- Outputs:
  - Extent of flood risk
  - Depth of flooding
  - Direction of flow paths
  - Identify properties and assets at risk

- **10,119** residential properties effected
- **4,114** properties at risk of inundation (OM2)
- **16** properties at risk from erosion (OM3)
- **704** commercial properties
- **74** listed structures
- **3** scheduled ancient monuments
- **4** critical access routes

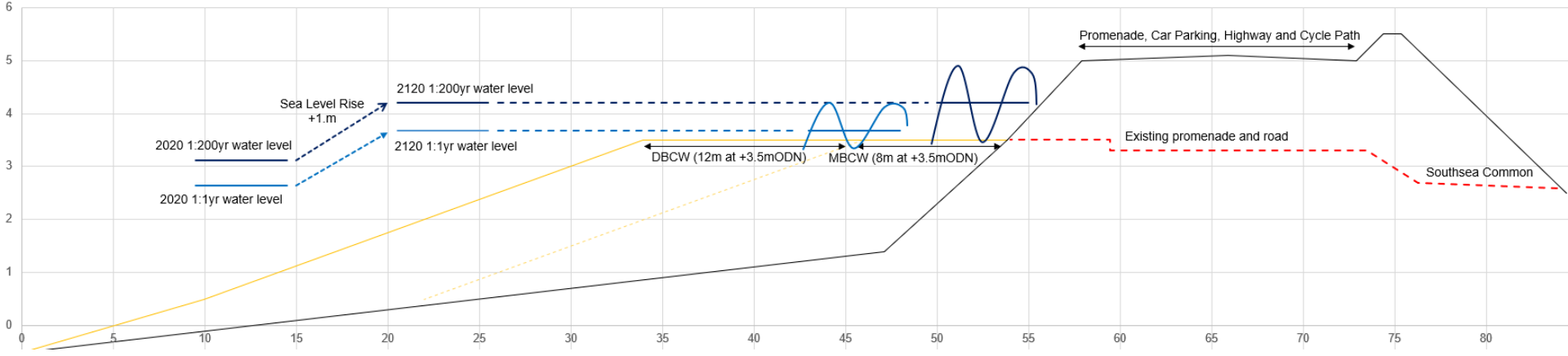
Frontage 1: Long Curtain Moat

- Raised promenade and upstand wall (Primary defence)
- Long Curtain Moat (Secondary defence)



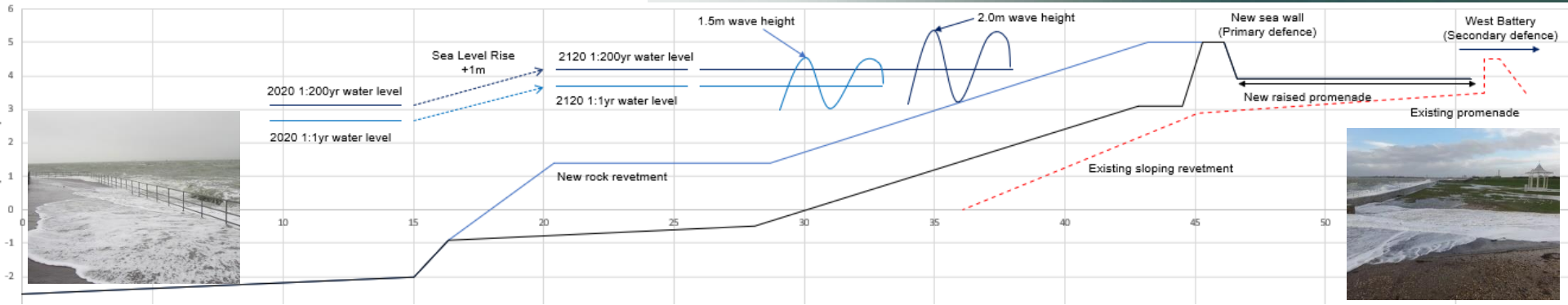
Frontage 3: Southsea Common

- Raised promenade and road (Primary defence)
- Beach recharge and recycling (Primary defence)
- New setback embankment (Secondary defence)



Frontage 4: Southsea Castle

- Raised promenade (Primary defence)
- Rock revetment (Primary defence)
- West Battery (Secondary defence)



Ready to Deliver

Programme / phase plan

2020-2022	2021-2023	2023-2024	2024-2025	2024-2025	2025-2026
					
SF1 - Long Curtain Moat	SF4 - Southsea Castle	SF3 - Southsea Common	SF5 - Pyramids to Pier	SF6 - Canoe Lake	SF2 - Clarence Pier

Enhancement and opportunities

Funding

Flood Defence Grant in Aid:	£107,390,003
Portsmouth City Council Contribution:	£6,519,268
Local Enterprise Partnerships:	£5,000,000
Funding total:	**£118,909,271**
Risk/contingency underwritten by PCC	£14,900,000

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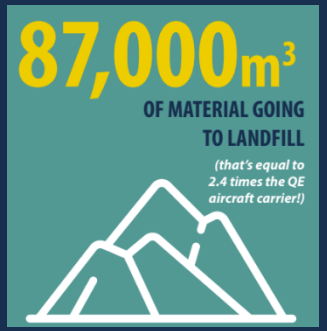
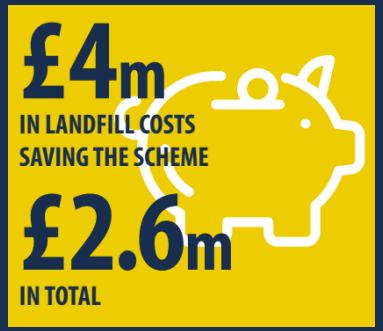
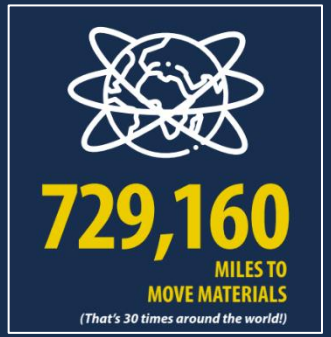
Zero Waste Scheme

To deliver a zero waste Scheme we will process and reuse material that is broken and excavated out of the existing structures. Clarence Pier Playing Field (MoD) has been leased by the Scheme to facilitate the on-site processing of material.

THIS WILL SAVE...







Summary of the Scheme

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A once in a lifetime opportunity to reduce flood risk to the Southsea Community for the next 100 years

A chance to transform the seafront for future generations whilst protecting the heritage that is so important

The scheme can stimulate regeneration and make this area vibrant a place for people and businesses

Placemaking and improvements to the public realm will be at the heart of our scheme

The money secured though flood defence Grant in Aid from government is for the design and build of flood defences.

New defences will need to be higher to respond to predicted sea level rise and an increase in the frequency of severe storms

In some places the promenade levels will need to increase by ~1 metre, but this can be mitigated by sensitive landscaping and positioning

The use of soft engineering techniques such as beach management will ensure we continue to have a seafront to be proud of. This will be designed to complement the hard concrete defences that are required to ensure resilient defences that do their job when most needed.

We need to carefully balance the needs of people and the environment to ensure we provide excellent flood defence infrastructure alongside enhancing the landscape and leisure experience for beach users. This is actually an opportunity to improve access to the coastline.

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Thank you

Find out more – www.southseacoastalscheme.org.uk

Get in contact – southseacoastalscheme@portsmouthcc.gov.uk