COASTAL TOPOGRAPHY: CONCRETE COASTS

Teacher Information Pack



Functional Skills Level 1 and 2 Units

Mapped to AQA Unit Awards Scheme and National Curriculum (KS4)

Yorkshire Marine Nature Partnership
EAST RIDING OF YORKSHIRE COUNCIL
Environment Agency
LCB Education

Teacher Information Pack

What's included in this pack:

Summary of Sections Created:

- Section 1: Overview, Curriculum Mapping, Lesson Sequence at a Glance
- Section 2: Key Concepts, Vocabulary List, Common Misconceptions
- Section 3: Resources and Preparation
- Section 4: Detailed Lesson Guides for Lessons 1–3 (UK Coastal Topography and Relief Maps, Coastal Landforms in Detail, Coastal Management Strategies)
- Section 5: Detailed Lesson Guides for Lessons 4–6 (Man-made versus Natural Habitats, Ecological Enhancement and Design, Critical Thinking and Debate)
- Section 6: Fieldwork Guidance, Health & Safety, SEND & Accessibility
- Section 7: Lesson Guides 7 and 8, Exemplar Answer Sheets, Extension Activities

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Section 1: Overview & Curriculum Mapping

Purpose
This teacher pack supports delivery of the Concrete Coast: Coastal Topography workbook, a KS4 Geography and Environmental Science resource designed to develop pupils' understanding of coastal processes, management strategies, and ecological enhancement. The workbook combines physical geography knowledge with critical thinking about sustainable coastal management and nature recovery.

What Pupils Will Learn
By completing this unit, pupils will:

- Understand UK coastal topography, key landforms, and erosion/flooding risks
- Explain coastal management strategies (hard and soft engineering) and their effectiveness
- Compare man-made and natural habitats, recognising ecological value
- Understand ecological enhancement as a nature recovery approach
- Apply knowledge to design sustainable coastal defence solutions with wildlife benefits
- Collect and interpret data from coastal field sites
- Develop critical thinking about trade-offs in coastal management

Links to Concrete Coast
The workbook embeds the Concrete Coast project's core themes:

- Ecological Enhancements & Why Needed: Pupils explore how man-made coastal structures (sea walls, groynes) can be modified or replaced with nature-based solutions (eco-tiles, habitat creation, saltmarsh restoration) to restore biodiversity while maintaining flood/erosion protection.
- How Monitored: The unit includes fieldwork guidance for monitoring species diversity, habitat quality, and coastal change using citizen science protocols aligned with Concrete Coast monitoring frameworks.
- Nature Recovery: Pupils examine case studies of ecological enhancement projects and design their own interventions, understanding how coastal habitats can be restored to support wildlife and ecosystem services.

Section 1: Overview & Curriculum Mapping

Curriculum Mapping

GCSE Geography Specification Links (Edexcel/AQA)
AQA GCSE Geography (8035):

- Theme 1: Landscapes and Physical Processes – Coastal landscapes and processes (1.3)
- Theme 3: Geographical Debates – Coastal management and sustainability debates (3.2)

Edexcel GCSE Geography (1GB0):

- Topic 2: Coastal Landscapes and Processes – Coastal erosion, management strategies, human interaction
- Topic 5: Human Interaction with Natural Systems – Sustainable management, conservation

AQA Unit Award Scheme (UAS) Links
Relevant Units:

- Unit 1: Exploring Landscapes – Understanding coastal landforms and processes
- Unit 2: Environmental Change – Coastal erosion, management, and sustainability
- Unit 3: Investigating Fieldwork – Data collection, analysis, and interpretation from coastal sites

LESSON SEQUENCE AT A GLANCE
Overview

- Total Duration: 8–10 lessons + 1–2 fieldwork sessions
- Flexible Delivery: Can be taught as a continuous unit or integrated into broader coastal/environmental topics
- Fieldwork Integration: Lessons 7–8 include on-site and classroom alternatives

A more comprehensive national curricuum mapping is provided at the end of this section in tabular form.

Section 1: Overview & Curriculum Mapping

Chunked Lesson Sequence at a Glance:

Lesson	Title	Key Outcomes
1	UK Coastal Topography & Relief Maps	Identify major UK coastal features; understand relief map conventions; locate coastal areas at risk
2	Coastal Landforms in Detail	Describe formation of key landforms (cliffs, beaches, spits, bars); explain processes
3	Coastal Management Strategies	Define hard and soft engineering; compare effectiveness; evaluate trade-offs
4	Man-Made vs. Natural Habitats	Contrast ecological value of engineered vs. natural coastal habitats; understand biodiversity loss
5	Ecological Enhancement & Design	Explain nature-based solutions; design a sea wall with ecological enhancements
6	Critical Thinking & Debate	Evaluate competing coastal management strategies; construct reasoned arguments

Total: 4-10 hours (flexible; can be condensed or extended)

National Curriculum Mapping

This Unit is also a part of AQA Unit Award Scheme:
UK coastal habitats

Use any AQA Approved centre to get a unit award certificate for this unit.

If you need a centre to do this for you, you can email a digital copy of the finished unit worksheets to
education@littlecraftersboxes.co.uk

	Unit Outcome	NC Links
1	Identify and locate a stretch of UK coastline using a map or digital tool, and add key place names to your relief map (summary sheet and/or student completed work)	Geography KS4 (Years 10-11): • Locational knowledge: "Extend their locational knowledge and deepen their spatial awareness of the world's countries using maps of the world focusing on... environmental regions, key physical and human characteristics" • Place knowledge: "Understand geographical similarities, differences and links between places through the study of human and physical geography of a region within the UK" • Geographical skills: "Build on their knowledge of globes, maps and atlases, and apply and develop this knowledge routinely in the classroom and in the field" • Map skills: "Interpret Ordnance Survey maps in the classroom and the field, including using grid references and scale, topographical and other thematic mapping" ICT/Computing (if using digital tools): • "Use technology purposefully to create, organise, store, manipulate and retrieve digital content" • "Select, use and combine a variety of software (including internet services) on a range of digital devices" Skills Developed: • Map reading and interpretation • Use of digital mapping tools (Google Maps, OS maps online) • Spatial awareness and locational knowledge • Research and information gathering • Locational knowledge
2	Create a 3D or layered map showing the land heights (cliffs, hills, lowlands) and sea depths for your chosen coastline (summary sheet and/or student completed work)	Geography KS4 (Years 10-11): • Geographical skills: "Interpret Ordnance Survey maps in the classroom and the field, including using grid references and scale, topographical and other thematic mapping, and aerial and satellite photographs" • Physical geography: "Understand how human and physical processes interact to influence, and change landscapes, environments and the climate" • Cartographic skills: Understanding of contour lines, relief representation, and bathymetric (sea depth) mapping Design & Technology KS4 (Years 10-11): • "Develop and communicate design ideas using annotated sketches, detailed plans, 3-D and mathematical modelling" • "Select from and use specialist tools, techniques, processes, equipment and machinery precisely" • "Apply computing and use electronics to embed intelligence in products" Art & Design (if applicable): • "Use a range of techniques and media, including painting, sculpture and other chosen area of interest" • "Develop ideas through investigations informed by contextual and other sources" Skills Developed: • 3D modelling and construction • Understanding of topography and bathymetry • Scale and proportion • Material selection and manipulation • Visual representation of data

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	Unit Outcome	NC Links
3	Show where each of these species isLabel at least three major landforms or coastal features (e.g., headland, bay, spit, estuary, floodplain) on your map (summary sheet and/or student completed work) found using a model, drawing, or digital representation (summary sheet and/or student completed work)	Geography KS4 (Years 10-11): • Physical geography: "Understand, through the use of detailed place-based exemplars at a variety of scales, the key processes in: physical geography relating to... geological timescales and plate tectonics; rocks, weathering and soils; weather and climate, including the change in climate from the Ice Age to the present; and glaciation, hydrology and coasts" • Coasts: Understanding of coastal processes including erosion, transportation, deposition, and the formation of coastal landforms • Landforms: "Understand the processes that give rise to key physical and human geographical features of the world, how these are interdependent and how they bring about spatial variation and change over time" Science KS4 (Years 10-11): • Earth and atmosphere: "The composition of the Earth... the rock cycle and the formation of igneous, sedimentary and metamorphic rocks" • Working scientifically: "Use appropriate methodology, including ICT, to answer scientific questions" Skills Developed: • Identification and classification of landforms • Understanding of coastal processes (erosion, deposition, longshore drift) • Application of geographical terminology • Observation and analysis
4	Research and show on your map one area at risk from coastal erosion or flooding, and explain why it is at risk (e.g., soft rock, low-lying land, storms) (summary sheet and/or student completed work)	Geography KS4 (Years 10-11): • Physical geography: "Understand, through the use of detailed place-based exemplars at a variety of scales, the key processes in physical geography relating to... coasts" • Human geography: "Understand how human and physical processes interact to influence, and change landscapes, environments and the climate" • Natural hazards: Understanding of coastal hazards including erosion and flooding • Risk assessment: "Understand the causes, consequences and responses to physical and human processes" Science KS4 (Years 10-11): • Earth and atmosphere: Understanding of rock types, weathering, and erosion • Working scientifically: "Evaluate risks both in practical science and the wider societal context, including perception of risk" Skills Developed: • Risk assessment and analysis • Understanding of geological processes • Research and evidence gathering • Critical thinking and evaluation • Application of knowledge to real-world scenarios

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	Unit Outcome	NC Links
5	Mark where a coastal management or enhancement strategy has been used or could be used (e.g., groynes, managed retreat, eco-tiles), and explain how it helps protect people or habitats (summary sheet and/or student completed work)	Geography KS4 (Years 10-11): • Human geography: "Understand how human and physical processes interact to influence, and change landscapes, environments and the climate" • Coastal management: Understanding of hard engineering, soft engineering, and managed retreat strategies • Sustainability: "Understand how human activity relies on effective functioning of natural systems" • Decision-making: "Build on their knowledge of... the interaction between physical and human processes... to deepen their understanding of the interaction between these processes and the environments and societies in which they occur" Science KS4 (Years 10-11): • Working scientifically: "Appreciate the power and limitations of science and consider ethical issues which may arise" • Ecosystems: Understanding of how human interventions affect ecosystems Design & Technology KS4 (Years 10-11): • "Identify and solve their own design problems and understand how to reformulate problems given to them" • "Develop specifications to inform the design of innovative, functional, appealing products" Skills Developed: • Understanding of coastal management strategies • Evaluation of costs and benefits • Application of knowledge to real-world problems • Critical analysis of human interventions • Understanding of sustainability
6	Research and describe the differences between man-made and natural habitats, how this influences wildlife, and what considerations are needed for ecological enhancements (summary sheet and/or student completed work)	Science KS4 (Years 10-11): • Ecosystems: "The interdependence of organisms in an ecosystem, including food webs and insect pollinated crops... how organisms affect, and are affected by, their environment, including the accumulation of toxic materials" • Biodiversity: Understanding of biodiversity, habitat loss, and conservation • Working scientifically: "Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas" Geography KS4 (Years 10-11): • Physical geography: "Understand, through the use of detailed place-based exemplars at a variety of scales, the key processes in: physical geography relating to... ecosystems" • Human impact: "Understand how human and physical processes interact to influence, and change landscapes, environments and the climate" • Sustainability: "Are informed about environmental, social and economic issues" Design & Technology KS4 (Years 10-11): • "Understand developments in design and technology, its impact on individuals, society and the environment, and the responsibilities of designers, engineers and technologists" Skills Developed: • Understanding of ecosystems and biodiversity • Comparison and contrast • Research and synthesis of information • Critical evaluation of human impacts • Understanding of ecological enhancement principles

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	Unit Outcome	NC Links
7	Design your own sea defence with enhancements (eg a new sea wall with texture tiles, built-in holes and shelter) (summary sheet and/or student completed work)	Design & Technology KS4 (Years 10-11): • "Identify and solve their own design problems and understand how to reformulate problems given to them" • "Develop specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations" • "Use research and exploration, such as the study of different cultures, to identify and understand user needs" • "Develop and communicate design ideas using annotated sketches, detailed plans, 3-D and mathematical modelling, oral and digital presentations and computer-based tools" • "Consider the use of new and emerging technologies" • "Understand developments in design and technology, its impact on individuals, society and the environment, and the responsibilities of designers, engineers and technologists" Geography KS4 (Years 10-11): • Coastal management: Application of knowledge about coastal defences and enhancement strategies • Sustainability: Designing solutions that balance human needs and environmental protection Science KS4 (Years 10-11): • Working scientifically: "Appreciate the power and limitations of science and consider ethical issues which may arise" • Ecosystems: Applying understanding of habitat requirements to design Art & Design (if applicable): • "Develop ideas through investigations informed by contextual and other sources, demonstrating analytical and cultural understanding" • "Refine ideas through experimenting and selecting appropriate resources, media, materials, techniques and processes" Skills Developed: • Creative problem-solving • Design thinking and innovation • Application of scientific and geographical knowledge • Technical drawing and modelling • Consideration of multiple constraints (cost, effectiveness, sustainability) • Evaluation and justification of design choices

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	Unit Outcome	NC Links
8	Present your map and model and explain how the shape of the land and sea affects risks, management, and human activity along the coast (summary sheet and/or student completed work)	National Curriculum Links: Geography KS4 (Years 10-11): • Geographical skills: "Communicate geographical information in a variety of ways, including through maps, numerical and quantitative skills and writing at length" • Synthesis: "Build on their knowledge of globes, maps and atlases and apply and develop this knowledge routinely in the classroom and in the field" • Analysis: "Understand the causes, consequences and responses to physical and human processes" Science KS4 (Years 10-11): • Working scientifically: "Present reasoned explanations, including explaining data in relation to predictions and hypotheses... present observations and other data using appropriate methods" • Communication: "Use and derive simple equations and carry out appropriate calculations... undertake basic data analysis including simple statistical techniques" English (Speaking and Listening): • "Speak confidently and effectively, including through: using Standard English confidently in a range of formal and informal contexts... giving short speeches and presentations, expressing their own ideas and keeping to the point" • "Participate in formal debates and structured discussions, summarising and/or building on what has been said" Design & Technology KS4 (Years 10-11): • "Analyse the work of past and present professionals and others to develop and broaden their understanding" • "Test, evaluate and refine their ideas and products against a specification, taking into account the views of intended users and other interested groups" Skills Developed: • Oral presentation and communication • Synthesis of complex information • Explanation and justification • Use of visual aids • Responding to questions • Critical evaluation

Section 2: Key Concepts and Vocabulary

Essential Vocabulary (Pre-teach before Lesson 1)

- Topography – the shape of the land
- Coastline – where the land meets the sea
- Relief – the height and shape of the land shown on a map
- Contour – a line on a map joining points at the same height
- Erosion – wearing away of rock/soil by wind, water, or ice
- Deposition – dropping of sediment (sand, pebbles) in a new location

Lesson-Specific Vocabulary

Lessons 1–2 (Topography & Landforms):

- Cliff, beach, spit, bar, headland, bay, cave, arch, stack, shore platform, wave-cut notch, slip-off slope

Lessons 3–4 (Management & Habitats):

- Sea wall, groyne, breakwater, rip-rap, beach nourishment, saltmarsh, mudflat, rocky shore, intertidal zone, biodiversity

Lessons 5–6 (Enhancement & Design):

- Ecological enhancement, nature-based solution, habitat creation, eco-tile, invasive species, native species, resilience

Lessons 7–8 (Fieldwork):

- Quadrat, transect, species richness, abundance, data quality, citizen science protocol

Pre-Teaching Strategy

- Lesson 1: Display key terms on a "Coastal Vocabulary Wall" with images (cliffs, beaches, etc.)
- Lesson 3: Use colour-coded cards for hard vs. soft engineering terms
- Lesson 5: Create a "Habitat Spectrum" poster (man-made ⇔ natural) with vocabulary positioned along it
- Lesson 7: Practise fieldwork vocabulary during classroom rehearsal before site visit

Section 2: Key Concepts and Vocabulary

Core Vocabulary (Introduced during lessons)

Concept	Definition	Why It Matters
Coastal Topography	The shape and features of the land along the coast, including cliffs, beaches, and landforms created by erosion and deposition.	Helps us understand why some coasts are at risk and where management is needed.
Coastal Erosion	The wearing away of rock and soil by waves, wind, and weather. Happens faster where rocks are soft or cliffs are exposed.	Threatens homes, infrastructure, and habitats; drives the need for management.
Coastal Flooding	When the sea level rises above the land (storm surge, high tide, sea-level rise) and water floods inland.	Puts people and property at risk; increasingly common due to climate change.
Hard Engineering	Man-made structures built to protect the coast (sea walls, groynes, breakwaters). They resist natural forces directly.	Effective in short term but expensive, can damage ecosystems, and may shift erosion elsewhere.
Soft Engineering	Nature-based or less invasive approaches (beach nourishment, saltmarsh creation, managed retreat). They work with natural processes.	More sustainable and cheaper long-term; can provide wildlife habitat; less effective in extreme events.
Ecological Enhancement	Deliberately improving or restoring habitats to increase biodiversity and ecosystem function. Often combines with coastal defence.	Recovers lost wildlife; improves water quality and resilience; provides co-benefits (recreation, wellbeing).
Man-Made Habitat	Habitats created or heavily modified by human activity (e.g., concrete sea walls, artificial ponds). Often have low species diversity.	Limited ecological value; can trap sediment or alter water flow; may harm native species.
Natural Habitat	Habitats that develop with minimal human intervention (rocky shores, saltmarsh, sand dunes). Support diverse species.	High biodiversity; resilient to change; provides ecosystem services (food, shelter, water filtration).
Biodiversity	The variety of different species (plants, animals, fungi) living in an area. Higher diversity = healthier ecosystem.	Indicates ecosystem health; supports food webs; makes systems more resilient to disturbance.
Coastal Squeeze	When rising sea levels or increased flooding push natural habitats (like saltmarsh) between the sea and hard defences, with nowhere to migrate.	Threatens coastal habitats; reduces biodiversity; shows why soft engineering and space for nature matter.
Monitoring	Regularly recording data on environmental conditions (species, habitat quality, coastal change) to track change over time.	Helps assess whether management is working; informs future decisions; contributes to citizen science.
Citizen Science	Scientific data collection by trained volunteers (not professional scientists). Concrete Coast uses this to monitor coastal change.	Increases data coverage; engages communities; makes science accessible; supports conservation.
Managed Retreat	Deliberately allowing the coast to erode or flood in some areas, moving human activity inland and creating space for nature.	Reduces long-term costs; creates habitat; adapts to climate change; controversial due to land loss.

Section 2: Key Concepts and Vocabulary

Technical Vocabulary (Optional, for challenge/GCSE)

Term	Definition
Succession	Gradual change in plant and animal communities over time
Climax community	A stable community that stops changing
Ecological niche	The role of an organism in its environment
Intertidal zone	The area between high and low tide marks
Substrate	The surface or material on which organisms live
Colonisation	The process of organisms moving into and establishing in a new area
Resilience	The ability of an ecosystem to recover from disturbance

Section 3: Resources and Preparation

What's Included in This Pack

- Workbook: Student-facing materials with activities, maps, diagrams, and reflection prompts
- Teacher pack (this document): Curriculum mapping, lesson guides, assessment tools, fieldwork protocols
- Digital resources: Relief maps of UK coast, coastal landform diagrams, species identification guides, data recording templates
- Fieldwork protocols: Site visit risk assessments, data collection sheets, citizen science guidance

What Teachers Need to Provide

- Printed materials: Workbook copies (1 per pupil); optional: enlarged relief maps, habitat identification cards
- ICT resources: Projector/interactive board for displaying maps and images; internet access for research activities
- Classroom materials: Coloured pencils, rulers, tracing paper (for mapping activities); crafting supplies for 3D map making, sticky notes (for reflection activities)
- Fieldwork equipment: Hand lenses, quadrats ($1m^2$), measuring tapes, species identification guides, clipboards, data recording sheets, cameras/phones for photography
- Optional practical materials: Clay/plaster for modelling landforms (Lesson 2); craft materials for designing sea walls (Lesson 5)

Printing Notes

- Workbook: Print double-sided, colour preferred (maps and photographs are clearer in colour)
- Relief maps: Printed A3 relief map of the coastline for reference
- Data sheets: Print on waterproof paper for fieldwork (Lessons 7–8)
- Vocabulary cards: Print on card stock and laminate for durability

Section 3: Resources and Preparation

Preparation Checklist

Before Lesson 1: UK Coastal Topography & Relief Maps

- Print workbook copies
- Prepare relief maps of UK coast (printed A3 or displayed digitally)
- Display "Coastal Vocabulary Wall" with images of key landforms
- Prepare coloured pencils, rulers, tracing paper for mapping activities
- Pre-teach essential vocabulary (topography, relief, contour, coastline, erosion)
- Prepare projector with UK map showing areas at risk from erosion/flooding
- Optional: Create a "coastal features bingo" card for engagement

Before Lesson 2: Coastal Landforms in Detail

- Print workbook
- Prepare enlarged diagrams of cliff formation, beach profiles, spits, and bars
- Gather modelling materials (clay, plaster, sand) if doing practical landform modelling
- Prepare hand lenses for examining photographs of real landforms
- Create vocabulary cards for key landforms (cliff, beach, spit, bar, cave, arch, stack)
- Prepare short video clips of wave action and coastal processes (optional but engaging)

Before Lesson 3: Coastal Management Strategies

- Print workbook pages
- Prepare colour-coded cards: hard engineering (red), soft engineering (blue), managed retreat (green)
- Gather images of real coastal defences (sea walls, groynes, beach nourishment)
- Prepare comparison matrix template for hard vs. soft engineering
- Pre-teach management vocabulary (hard engineering, soft engineering, effectiveness, trade-off)
- Prepare debate scenario cards for critical thinking activity (page 17)
- Check that pupils understand "effectiveness" criteria (cost, longevity, environmental impact, community acceptance)

Section 4: Lesson Guides (lessons 1 through 3)

Lesson 1: UK Coastal Topography and Relief Maps

Learning Objective
Pupils will identify major UK coastal features and understand how relief maps show coastal topography and areas at risk.
Success Criteria

- I can name and locate major UK coastal features (headlands, bays, cliffs, beaches)
- I can read and interpret relief maps using contour lines and height indicators
- I can identify coastal areas at higher risk from erosion or flooding
- I can explain why some coasts are more vulnerable than others

Starter
Activity: "Coastal Features Bingo"

- Display images of different UK coastal features (Cliffs of Dover, Holderness coast, Cornish beaches, Scottish lochs)
- Pupils match features to their locations on a blank UK map
- Discuss: "Why do you think some coasts look so different? What causes these differences?"

Teacher Prompt: "Look at the shape of the coastline. Is it straight or jagged? What might that tell us about the rocks underneath?"

Main
Activity 1: Relief Maps & Topography

- Display a relief map of the UK coast
- Explain contour lines: "Each line shows a different height. The closer the lines, the steeper the slope."
- Model reading a relief map: "Here's a steep cliff (close contours). Here's a gentle beach (far apart contours)."
- Pupils complete workbook pages and:
  - Label key coastal features on a map
  - Identify areas with steep relief (vulnerable to erosion) vs. gentle relief (vulnerable to flooding)
  - Colour-code areas by risk level

Teacher Prompts:

- "What do close contour lines tell us about the landscape?"
- "Why might a steep cliff erode faster than a gentle slope?"
- "Which areas of the UK coast do you think are most at risk? Why?"

Activity 2: Coastal Risk Assessment

- Discuss: "Not all coasts erode at the same rate. What factors might make a coast more vulnerable?"
- Pupils examine pages 4–6 (coastal erosion and flooding risks)
- Complete comparison task: "Why are some areas at higher risk than others?"
- Identify case studies (e.g., Yorkshire coast, Cornish cliffs)

Section 4: Lesson Guides (lessons 1 through 4)

Key Misconceptions to Address:

- "All coasts erode at the same rate." → Different rock types, wave exposure, and human activity cause different rates
- "Erosion only happens on cliffs." → Beaches and mudflats also erode; flooding is a separate but related risk
- "Relief maps only show height." → They also show slope steepness, which indicates vulnerability

Differentiation

Support:

- Provide a pre-labelled relief map with key features already marked
- Use simplified contour explanations: "Close lines = steep; far lines = gentle"
- Pair pupils for mapping activities; scribe for pupils with writing difficulties
- Offer a word bank for labelling features

Challenge:

- Ask pupils to calculate gradient using contour intervals: "If contours are 50m apart and 2cm on the map, what's the gradient?"
- Extend: "Research the Holderness coast. Why is it eroding faster than other UK coasts?"
- Ask pupils to predict future coastal change based on current topography and climate projections

Assessment Opportunities

Quick Checks:

- Can pupils identify relief map symbols and explain what they mean?
- Can they locate major UK coastal features accurately?
- Do they understand the link between topography and coastal vulnerability?

Exit Ticket Prompts:

- "Name one coastal feature and explain why it's at risk from erosion or flooding."
- "What do contour lines tell us about a landscape?"
- "Which UK coast do you think is most vulnerable? Why?"

Section 4: Lesson Guides (lessons 1 through 3)

Lesson 2: Coastal Landforms in Detail

Learning Objective
Pupils will describe the formation of key coastal landforms and explain the processes that create them.
Success Criteria

- I can describe how cliffs, beaches, spits, and bars form
- I can explain the role of erosion, deposition, and wave action in landform formation
- I can identify landforms from photographs and diagrams
- I can use correct geographical terminology to explain processes

Starter
Activity: "Landform Detective"

- Display close-up photographs of different coastal landforms (cliff face, beach profile, spit, cave)
- Pupils guess what each landform is and why it might have formed
- Discuss: "What do you notice about the rocks? The shape? The position relative to the sea?"

Teacher Prompt: "Waves are powerful. What do you think they do to the rocks over time?"

Main
Activity 1: Cliff Formation & Wave Processes

- Explain wave action: "Waves carry energy. They crash against rocks, breaking them apart. This is called erosion."
- Use diagram to show cliff formation:
  - Wave-cut notch (where waves undercut the cliff base)
  - Weathering (rain, frost, salt spray breaking down rocks)
  - Rockfall (when the cliff becomes unstable and collapses)
- Model with hand gestures: "The wave hits here (point to base), creates a notch, the rock above becomes unsupported, and it falls."
- Pupils label a diagram showing cliff formation stages

Teacher Prompts:

- "Why does the cliff collapse? What's supporting it?"
- "Which rocks do you think erode faster—granite or chalk? Why?"
- "What happens to the rocks after they fall? Where do they go?"

Activity 2: Beaches, Spits, Estuaries, Bay

- Explain deposition: "Waves also carry sediment (sand, pebbles). When they slow down, they drop it. This builds beaches."
- Use diagrams:
  - Beach profile (foreshore, backshore, berms)
  - Spit formation (sediment carried along coast, deposited at a point)
  - Estuaries and floodplanes
- Model spit formation: "Imagine sediment moving along the coast like a conveyor belt. When it reaches a headland or bay, it can't go further, so it builds out into the sea."
- Pupils complete mapping activity: locate features on a UK coast map

Section 4: Lesson Guides (lessons 1 through 3)

Teacher Prompts:
- "Why do beaches have different slopes? What causes this?"
- "How long do you think it takes to build a spit? Days? Years? Centuries?"
- "What happens to the water trapped behind a bar? What lives there?"

Activity 3: Practical Activity (Optional)
- Landform Modelling: Use sand, water, and a tray to model wave action, cliff erosion, and beach formation
- Pupils observe: "What happens when waves hit the sand? How does it change shape?"
- Link back to real coasts: "This is what happens on real beaches, but over months and years."

Key Misconceptions to Address:
- "Beaches are permanent." → They change shape seasonally and can disappear during storms
- "Spits form overnight." → They develop over many years through gradual sediment accumulation
- "All cliffs are made of the same rock." → Different rock types erode at different rates; softer rocks erode faster
- "Erosion is always bad." → It's a natural process; the problem is when it threatens human settlements

Differentiation
Support:
- Provide labelled diagrams of landform formation; pupils trace and colour them
- Use simplified process explanations: "Waves break rocks → rocks become sand → sand builds beaches"
- Offer photographs of real landforms alongside diagrams for visual support
- Pair pupils for practical activities; provide step-by-step instructions

Challenge:
- Ask pupils to explain the difference between hydraulic action, abrasion, and attrition (three types of wave erosion)
- Extend: "Why do you think some beaches have pebbles and others have sand? What determines this?"
- Ask pupils to predict how a spit might change if sea level rose or wave direction changed

Assessment Opportunities
Quick Checks:
- Can pupils label a cliff formation diagram correctly?
- Do they understand the sequence of events in spit formation?
- Can they explain why beaches change shape?

Exit Ticket Prompts:
- "Describe how a spit forms. What role do waves play?"
- "Why do some cliffs collapse? Explain the process."
- "What's the difference between a beach and a spit?"

Section 4: Lesson Guides (lessons 1 through 3)

Lesson 3: Coastal Management Strategies

Learning Objective
Pupils will define hard and soft engineering strategies, compare their effectiveness, and evaluate trade-offs.
Success Criteria

- I can describe hard engineering (sea walls, groynes, breakwaters) and soft engineering (beach nourishment, saltmarsh creation, managed retreat)
- I can compare the advantages and disadvantages of each strategy
- I can explain why different coasts use different management approaches
- I can evaluate trade-offs (cost vs. effectiveness, short-term vs. long-term, environmental impact)

Starter
Activity: "Hard or Soft?"

- Display images of different coastal defences (sea wall, groyne, beach nourishment, saltmarsh, managed retreat)
- Pupils sort them into two groups: "Hard" (built structures) and "Soft" (nature-based)
- Discuss: "Why do you think some defences are 'hard' and others 'soft'? What's the difference?"

Teacher Prompt: "Imagine you're a coastal manager. A town is flooding. What would you build to protect it? Why?"

Main
Activity 1: Hard Engineering

- Explain hard engineering: "These are man-made structures built to resist waves and erosion."
- Use workbook pages to describe:
  - Sea wall: A barrier built along the coast. Reflects waves; protects land behind it
  - Groyne: A barrier built perpendicular to the coast. Traps sediment; builds up beaches
  - Breakwater: A barrier built offshore. Reduces wave energy reaching the shore
  - Rip-rap: Large rocks piled along the shore. Absorbs wave energy
- Show real photographs of each structure
- Discuss advantages: "What's good about these? Why would a town build them?"
  - Effective at protecting against erosion and flooding
  - Visible, tangible protection
  - Can last many decades
- Discuss disadvantages: "What problems might they cause?"
  - Expensive (£1000s–£1000000s per km)
  - Can trap sediment, causing erosion elsewhere ("coastal squeeze")
  - Ugly; changes the character of the coast
  - Maintenance required; eventually fails
  - Doesn't help wildlife

Teacher Prompts:

- "A sea wall costs £5 million to build. Is that worth it? For whom?"
- "If a groyne traps sediment here, what happens to the beach next to it?"
- "Why might a sea wall fail? What could damage it?"

Section 4: Lesson Guides (lessons 1 through 3)

Activity 2: Soft Engineering

- Explain soft engineering: "These strategies work with natural processes instead of against them."
- Use workbook pages to describe:
  - Beach nourishment: Adding sand/pebbles to build up beaches
  - Saltmarsh creation: Planting saltmarsh vegetation to slow waves and trap sediment
  - Dune restoration: Protecting and restoring sand dunes
  - Managed retreat: Allowing the coast to erode in some areas; moving human activity inland
- Show real photographs and case studies
- Discuss advantages: "Why might soft engineering be better?"
  - Cheaper than hard engineering (initially)
  - Sustainable; works with nature
  - Can provide wildlife habitat
  - Improves water quality and resilience
  - More acceptable to communities
- Discuss disadvantages: "What are the problems?"
  - Less effective in extreme events
  - Requires ongoing maintenance (beach nourishment must be repeated)
  - Managed retreat is controversial; people lose land
  - Takes longer to work
  - May not protect all settlements

Teacher Prompts:

- "Beach nourishment costs £500k per km but only lasts 5 years. Hard engineering costs £5M but lasts 30 years. Which is better? Why?"
- "If we use managed retreat, who loses their homes? Is that fair?"
- "Can soft engineering protect a city? When might it not be enough?"

Activity 3: Comparison & Critical Thinking

- Pupils complete workbook pages comparison activities:
  - Compare/contrast hard and soft engineering using a Venn diagram or table
  - Evaluate which strategy is "best" for different coastal situations
  - Identify trade-offs: cost vs. effectiveness, short-term vs. long-term, environmental impact vs. protection
- Introduce the idea of "integrated coastal zone management": "Often, the best solution uses both hard and soft engineering together."

Key Misconceptions to Address:

- "Hard engineering is always bad." → It's effective in the short term; the problem is long-term sustainability and cost
- "Soft engineering is always better." → It's not effective enough for all situations; sometimes hard engineering is necessary
- "Coastal management is simple." → It involves complex trade-offs between protection, cost, environment, and fairness
- "Erosion can be stopped completely." → It's a natural process; management can only slow it down or redirect it

Section 4: Lesson Guides (lessons 1 through 3)

Differentiation

Support:
- Provide a comparison table with hard and soft engineering already partially filled in
- Use simplified language: "Hard = built; Soft = natural"
- Offer colour-coded cards (red for hard, blue for soft) to sort strategies
- Pair pupils for discussion; scribe for pupils with writing difficulties
- Provide sentence starters: "Hard engineering is good because... Hard engineering is bad because..."

Challenge:
- Ask pupils to research a specific coastal management project (e.g., Thames Barrier, Holderness coast management)
- Extend: "Design an integrated coastal management strategy for a town. Use both hard and soft engineering. Justify your choices."
- Ask pupils to evaluate the cost-effectiveness of different strategies using real data
- Debate: "Should we use managed retreat to protect nature, or hard engineering to protect people? What's more important?"

Assessment Opportunities

Quick Checks:
- Can pupils define hard and soft engineering?
- Do they understand the advantages and disadvantages of each?
- Can they identify which strategy is used in different coastal situations?

Exit Ticket Prompts:
- "Name one hard engineering strategy and one soft engineering strategy. Which is more sustainable? Why?"
- "A town is eroding. What would you recommend: hard engineering, soft engineering, or both? Justify your answer."
- "What are the trade-offs between protecting people and protecting nature?"

Section 5: Lesson Guides (lessons 4 through 6)

Lesson 4: Man-made versus Natural Habitats

Learning Objective
Pupils will contrast the ecological value of man-made and natural coastal habitats and understand why biodiversity matters.
Success Criteria

- I can describe the characteristics of man-made and natural coastal habitats
- I can explain why natural habitats support more biodiversity
- I can identify the ecological benefits of natural habitats (food, shelter, water filtration)
- I can explain how coastal management affects wildlife

Starter
Activity: "Habitat Spectrum"

- Display images along a spectrum: concrete sea wall → rocky shore → saltmarsh → sandy shore
- Pupils predict: "Which has the most wildlife? Why?"
- Discuss: "What makes a good habitat for animals and plants?"

Teacher Prompt: "Imagine you're a crab. Would you rather live on a concrete sea wall or a rocky shore? Why?"

Main
Activity 1: Man-Made Habitats

- Use workbook pages to examine man-made coastal structures:
  - Concrete sea walls, groynes
  - Artificial rock pools
  - Harbour walls
- Discuss characteristics:
  - Hard, smooth surfaces (no crevices for shelter)
  - No food sources (algae, invertebrates)
  - No variation in height or texture
  - Can be hot/cold/exposed
- Show photographs: "What animals live here? Why so few?"
- Key point: "Man-made habitats are designed to protect people, not wildlife."

Teacher Prompts:

- "Why would a crab struggle on a smooth concrete wall?"
- "What food would a seabird find on a sea wall?"
- "How is a sea wall different from a rocky shore?"

Activity 2: Natural Habitats

- Use workbook pages to examine natural coastal habitats:
  - Rocky shores (rock pools, crevices, algae)
  - Saltmarsh (plants, invertebrates, fish nursery)
  - Sand dunes (plants, insects, birds)
  - Mudflats (worms, molluscs, feeding birds)

Section 5: Lesson Guides (lessons 4 through 6)

- Discuss characteristics:
  - Varied texture and structure (crevices, pools, plants)
  - Food sources (algae, invertebrates, seeds)
  - Shelter and nesting sites
  - Gradual changes in water level and salinity
- Show photographs: "What animals live here? Why so many?"
- Key point: "Natural habitats support diverse food webs and provide ecosystem services."

Teacher Prompts:

- "What lives in a rock pool? Why is it important?"
- "Why do fish use saltmarsh as a nursery?"
- "What would happen if we removed all the saltmarsh?"

Activity 3: Comparison & Ecological Value

- Pupils complete workbook pages comparison activities:
  - Compare biodiversity in man-made vs. natural habitats
  - Identify ecosystem services provided by natural habitats (food, shelter, water filtration, carbon storage)
  - Explain why biodiversity matters (resilience, food security, human wellbeing)
- Introduce "ecological enhancement": "We can design coastal defences that also provide habitat."

Key Misconceptions to Address:

- "Sea walls are good because they protect people." → True, but they harm wildlife; we can do both
- "Wildlife doesn't matter if people are safe." → Wildlife provides services we depend on (food, water, air quality)
- "Natural habitats are just empty spaces." → They're complex ecosystems supporting thousands of species
- "Man-made habitats can replace natural ones." → They can't provide the same ecosystem services

Differentiation

Support:

- Provide a partially completed comparison table (man-made vs. natural)
- Use simplified descriptions: "Man-made = few animals; Natural = many animals"
- Offer photographs with labels showing animals and plants
- Pair pupils for discussion; scribe for writing difficulties
- Provide word bank: habitat, species, biodiversity, ecosystem, shelter, food

Challenge:

- Ask pupils to research a specific habitat (e.g., Morecambe Bay saltmarsh) and create a species list
- Extend: "Design a man-made habitat that supports wildlife. What features would it need?"
- Ask pupils to calculate biodiversity using a simple index (species richness, abundance)
- Debate: "Can we protect people AND wildlife? How?"

Section 5: Lesson Guides (lessons 4 through 6)

Assessment Opportunities
Quick Checks:

- Can pupils name animals that live in natural vs. man-made habitats?
- Do they understand why natural habitats support more biodiversity?
- Can they explain the link between habitat structure and species diversity?

Exit Ticket Prompts:

- "Why do you think a rocky shore has more wildlife than a sea wall?"
- "What ecosystem services does a saltmarsh provide?"
- "How does coastal management affect wildlife?"

Section 5: Lesson Guides (lessons 4 through 6)

Lesson 5: Ecological Enhancement and Design

Learning Objective
Pupils will explain nature-based solutions and design a coastal defence that combines protection with wildlife benefits.
Success Criteria

- I can describe ecological enhancement strategies (habitat creation, eco-tiles, saltmarsh restoration)
- I can explain how nature-based solutions provide both protection and biodiversity benefits
- I can design a sea wall with ecological enhancements
- I can justify my design choices

Starter
Activity: "The Best of Both Worlds"

- Show a side-by-side comparison: traditional sea wall vs. sea wall with eco-tiles and saltmarsh
- Pupils predict: "Which protects people better? Which is better for wildlife? Can we have both?"
- Discuss: "What if we designed defences that do both?"

Teacher Prompt: "Imagine a sea wall that's also a home for crabs, fish, and seabirds. Is that possible?"

Main
Activity 1: Ecological Enhancement Strategies

- Use workbook pages to introduce nature-based solutions:
  - Eco-tiles: Textured tiles attached to sea walls, creating habitat for invertebrates and fish
  - Saltmarsh creation: Planting salt-tolerant plants to slow waves and trap sediment
  - Oyster reefs: Restoring native oyster beds to filter water and provide habitat
  - Seagrass meadows: Planting underwater meadows for fish nurseries
  - Dune restoration: Protecting and restoring sand dunes for plants and birds
- Show photographs of real projects
- Discuss benefits:
  - Provides habitat for wildlife
  - Improves water quality
  - Increases resilience (multiple lines of defence)
  - Cheaper than hard engineering alone
  - Community engagement and wellbeing
- Key point: "Ecological enhancement combines coastal defence with nature recovery."

Teacher Prompts:

- "How do eco-tiles help wildlife?"
- "Why would fish use a saltmarsh?"
- "What's the difference between a hard engineering + enhancement approach and a pure soft engineering approach?"

Section 5: Lesson Guides (lessons 4 through 6)

Activity 2: Case Study Analysis

- Use workbook pages and case study (or show real examples):
  - Describe a real ecological enhancement project
  - Identify the problem (erosion, flooding, habitat loss)
  - Explain the solution (combination of hard and soft engineering + enhancement)
  - Evaluate the outcomes (protection, biodiversity, cost, community response)
- Pupils complete reflection questions:
  - "What was the problem?"
  - "How did enhancement help?"
  - "What was successful? What could be improved?"

Activity 3: Design Activity

- Pupils complete workbook design task: "Design a sea wall with ecological enhancements"
- Provide a template showing:
  - The problem (erosion, flooding)
  - The location (type of coast, rock type, existing habitat)
  - The design (sea wall + enhancements)
  - Labels explaining each feature
  - Justification: "Why will this work? How does it help wildlife?"
- Encourage creativity: "What features would you add? Why?"

Design Prompts:

- "What materials would you use?"
- "What wildlife do you want to attract?"
- "How would you monitor success?"
- "What challenges might you face?"

Key Misconceptions to Address:

- "Ecological enhancement is just decoration." → It provides real habitat and ecosystem services
- "Nature-based solutions can't protect people." → They can, especially when combined with hard engineering
- "Enhancement is too expensive." → It's often cheaper than hard engineering alone and provides multiple benefits
- "Wildlife will automatically colonise new habitats." → It takes time and management; we may need to help species establish

Differentiation

Support:

- Provide a partially completed design template with some features already drawn
- Offer a menu of enhancement options to choose from
- Use simplified language: "Add texture to help animals live on the wall"
- Pair pupils for design activity; scribe for writing difficulties
- Provide sentence starters: "I chose eco-tiles because... This will help wildlife by..."

Section 5: Lesson Guides (lessons 4 through 6)

Challenge:

- Ask pupils to research a real ecological enhancement project and present findings
- Extend: "Calculate the cost of your design vs. a traditional sea wall. Is it worth it?"
- Ask pupils to design a monitoring plan: "How would you check if your enhancement is working?"
- Debate: "Should all coastal defences include ecological enhancements? Why or why not?"

Assessment Opportunities

Quick Checks:

- Can pupils describe at least two ecological enhancement strategies?
- Do they understand how enhancement benefits both people and wildlife?
- Can they design a sea wall with appropriate enhancements?

Exit Ticket Prompts:

- "Name one ecological enhancement strategy and explain how it helps wildlife."
- "Why might a sea wall with eco-tiles be better than a plain sea wall?"
- "What challenges might you face when designing an ecological enhancement project?"

Section 5: Lesson Guides (lessons 4 through 6)

Lesson 6: Critical Thinking and Debate

Learning Objective
Pupils will evaluate competing coastal management strategies and construct reasoned arguments about trade-offs.
Success Criteria

- I can identify the advantages and disadvantages of different management strategies
- I can evaluate trade-offs (cost, effectiveness, environmental impact, fairness)
- I can construct a reasoned argument using evidence
- I can listen to opposing views and respond respectfully

Starter
Activity: "The Dilemma"

- Present a coastal management scenario:
  - "A town is eroding. 100 homes are at risk. The council has three options:
    - Hard engineering (£10M, protects everyone, harms wildlife)
    - Soft engineering (£2M, less effective, helps wildlife)
    - Managed retreat (£5M, moves people inland, creates nature reserve)
  - What would you choose? Why?"
- Pupils vote and discuss: "What matters most? Protection? Cost? Environment? Fairness?"

Teacher Prompt: "There's no perfect answer. Let's think through the trade-offs."

Main
Activity 1: Trade-Off Analysis

- Use pages workbook and case studies to examine trade-offs:
  - Cost vs. Effectiveness: Hard engineering is expensive but effective. Soft engineering is cheaper but less effective.
  - Short-term vs. Long-term: Hard engineering protects now but may fail later. Soft engineering takes longer but is more sustainable.
  - Protection vs. Environment: Hard engineering protects people but harms wildlife. Soft engineering helps nature but may not protect everyone.
  - Fairness: Who pays? Who benefits? Who loses?
- Create a trade-off matrix:
  - Rows: different strategies
  - Columns: cost, effectiveness, environmental impact, community acceptance, fairness
  - Pupils rate each strategy (high/medium/low) and discuss why

Teacher Prompts:

- "Is it fair to spend £10M to protect 100 homes?"
- "Is it fair to use managed retreat if it means people lose their homes?"
- "Can we protect both people and nature?"
- "Who should make these decisions?"

Section 5: Lesson Guides (lessons 4 through 6)

Activity 2: Structured Debate

- Divide class into groups representing different stakeholders:
  - Group A (Hard engineering advocates): "We must protect people first. Hard engineering is the only way."
  - Group B (Soft engineering advocates): "We must work with nature. Soft engineering is sustainable and cheaper."
  - Group C (Managed retreat advocates): "We must adapt to climate change. Managed retreat is the future."
  - Group D (Judges): "Evaluate the arguments. Which is best for this specific coast?"
- Each group prepares a 2-minute argument using evidence from the workbook
- Groups present arguments; judges ask questions and decide
- Whole class discussion: "What's the best approach? Does it depend on the situation?"

Debate Prompts:

- "What evidence supports your position?"
- "What are the weaknesses in the other arguments?"
- "What would you say to someone who disagrees with you?"
- "Is there a compromise? Can we use multiple strategies?"

Activity 3: Reflection

- Pupils complete wokbook pages reflection:
  - "What did you learn from the debate?"
  - "Did your mind change? Why or why not?"
  - "What's the best approach for different coasts?"
  - "Who should make these decisions?"

Key Misconceptions to Address:

- "There's one right answer." → Coastal management involves complex trade-offs; different situations need different solutions
- "Cost is the only factor." → We must consider effectiveness, environment, fairness, and long-term sustainability
- "People's needs are more important than nature." → We depend on nature; protecting wildlife protects us
- "Scientists should decide." → Decisions involve values and politics; communities should be involved

Differentiation

Support:

- Provide pre-written argument cards with key points
- Pair pupils for debate; scribe for speaking difficulties
- Use simplified language: "Hard = built; Soft = natural; Managed retreat = move people"
- Offer sentence starters: "I think hard engineering is best because... However, soft engineering is better because..."
- Reduce debate to 3 groups instead of 4

Section 5: Lesson Guides (lessons 4 through 6)

Challenge:

- Ask pupils to research a real coastal management decision (e.g., Holderness coast, Thames Barrier) and present findings
- Extend: "Design a coastal management strategy for a specific UK coast. Justify your choices using evidence."
- Ask pupils to evaluate the decision-making process: "Who was consulted? Was it fair? What would you change?"
- Debate: "Should we prioritise protecting people or nature? Can we do both?"

Assessment Opportunities

Quick Checks:

- Can pupils identify trade-offs in different management strategies?
- Do they understand that decisions involve multiple factors?
- Can they construct a reasoned argument using evidence?

Exit Ticket Prompts:

- "What are the trade-offs between hard and soft engineering?"
- "What's the best coastal management strategy? Why?"
- "Who should make decisions about coastal management?"

Section 6: Fieldwork Guidance

Lessons 7–8 include fieldwork to collect real data on coastal habitats and management effectiveness. This can be:

- On-site: Visit a real coastal location (beach, rocky shore, saltmarsh, managed defence)
- Classroom alternative: Use photographs, video, or virtual fieldwork if a visit isn't possible

Suggested Local Alternatives

- Rocky shores: Tide pools, rock crevices, algae-covered rocks
- Sandy beaches: Beach profiles, dune vegetation, erosion features
- Saltmarsh: Vegetation zonation, invertebrate diversity, water quality
- Managed defences: Eco-tiles, groynes, beach nourishment evidence
- Urban coasts: Harbour walls, marinas, artificial structures and wildlife

Data Collection Method

Species Monitoring (Biodiversity):

- Use a 1m² quadrat to count species in different habitats
- Record: species name, abundance (number of individuals), percentage cover
- Repeat in 3–5 locations (e.g., sea wall, rocky shore, saltmarsh)
- Calculate species richness (number of species) and abundance

Habitat Quality Assessment:

- Rate habitat quality (1–5 scale):
  - Structure (varied vs. uniform)
  - Food sources (present vs. absent)
  - Shelter (good vs. poor)
  - Disturbance (low vs. high)
- Record observations: "What animals did you see? What plants? Signs of damage?"

Coastal Change Monitoring:

- Measure erosion: cliff height, beach width, sediment type
- Photograph evidence: erosion features, management structures, wildlife
- Record observations: "Is the coast eroding or accreting? Why?"

Data Quality Tips:

- Be consistent: use same method in all locations
- Record exact location (GPS, map reference, description)
- Take photographs of each quadrat
- Note date, time, weather conditions
- Double-check measurements; repeat if uncertain
- Identify species carefully; use guides or ask expert if unsure

What "Good Data" Looks Like

- Accurate: Measurements are precise; species are correctly identified
- Consistent: Same method used in all locations; no shortcuts
- Complete: All required fields filled in; no missing data
- Contextual: Location, date, weather, observer notes recorded
- Photographed: Visual evidence of each sampling location
- Verifiable: Another person could repeat the study and get similar results

Section 6: Fieldwork Guidance

Running Fieldwork Without a Trip

Option 1: Virtual Fieldwork

- Use Google Street View to explore coastal locations
- Examine photographs of habitats and species
- Complete data recording sheets using provided images
- Compare data from different locations

Option 2: Classroom Simulation

- Create a "coastal habitat" in the classroom using photographs, specimens, and models
- Pupils conduct quadrat surveys using images
- Record data as if they were in the field
- Analyse data and draw conclusions

Option 3: Local Alternative

- Visit a local pond, stream, or park with similar habitats
- Collect data using same methods
- Compare results to coastal data
- Discuss differences

Section 6: Health and Safety

HEALTH & SAFETY / RISK ASSESSMENT NOTES

Classroom Practicals (Lessons 1–6)
Hazards & Controls:

- Scissors/cutting tools: Pupils may cut themselves
  - Control: Supervise use; provide safety scissors; demonstrate safe handling
- Coloured pencils/markers: Pupils may poke eyes or inhale dust
  - Control: Supervise use; ensure adequate ventilation; check for allergies to materials
- Modelling materials (clay, plaster): Pupils may inhale dust or have allergic reactions
  - Control: Use wet materials to reduce dust; provide masks if needed; check for allergies
- Water (for modelling activities): Spillage may cause slips
  - Control: Use trays to contain water; clean spills immediately; provide towels

Coastal Visit Safety (Lessons 7–8)
Pre-Visit Planning:

- Check tide times and weather forecast
- Identify hazards: cliffs, rocks, deep water, currents, slippery surfaces
- Plan escape routes if weather deteriorates
- Arrange transport and parking
- Brief pupils on safety rules before visit
- Obtain parental consent and emergency contact details
- Check insurance and safeguarding procedures

Hazards and Controls:

Hazard	Risk	Control
Tides	Pupils & rising tide	Check tide times; set time limits; designate safe area; use buddy system
Rocks/cliffs	Falls, slips, cuts	Wear appropriate footwear; supervise closely; avoid unstable areas; provide first aid kit
Deep water	Drowning	Establish water boundary; use buddy system; provide life jackets if necessary; supervise constantly
Currents/waves	Being swept away	Avoid strong currents; supervise water activities; teach safe entry/exit
Weather	Hypothermia, exposure	Check forecast; provide warm clothing; have shelter plan; monitor pupils for signs of cold
Sharp objects	Cuts, infections	Provide gloves; check area for broken glass, metal; treat cuts with first aid
Sun exposure	Sunburn, heat exhaustion	Provide sun cream; encourage hats; ensure water available; monitor for heat exhaustion
Allergies	Allergic reactions	Check for shellfish/seafood allergies; have antihistamines available; know location of nearest hospital

Section 6: Health and Safety

Safeguarding Reminders:

- Maintain appropriate adult-to-pupil ratios (at least 1:15 for KS4)
- Use buddy system; pupils work in pairs and check in regularly
- Establish clear communication (whistle signals, check-in times)
- Have emergency contact details and first aid kit
- Brief pupils on appropriate behaviour and dress code
- Be aware of safeguarding concerns; report to designated safeguarding lead if needed

PPE & Equipment:

- Sturdy footwear (not sandals or flip-flops)
- Warm, waterproof clothing (even in summer, sea is cold)
- Sun cream and hats
- Gloves (for handling rocks, invertebrates)
- First aid kit
- Clipboards, data sheets, pencils (waterproof if possible)
- Cameras/phones for photographs
- Hand lenses and identification guides
- Quadrats and measuring tapes

Allergies & Health Conditions:

- Check for shellfish/seafood allergies (coastal environments)
- Check for asthma (salt spray can trigger attacks)
- Check for mobility issues (rocky terrain may be difficult)
- Provide alternatives for pupils who can't access certain areas
- Have emergency medications available (inhalers, EpiPens)

Section 6: SEND and Accessibility Guidance

Low-Demand Language Options
Instead of: "Evaluate the effectiveness of hard engineering strategies" Use: "Is hard engineering good or bad? Why?"
Instead of: "Analyse the trade-offs between coastal protection and ecological value" Use: "What's good about protecting people? What's bad about it for wildlife?"
Instead of: "Synthesise information from multiple sources to construct an argument" Use: "Use what you've learned to explain why you think this is the best idea"
Instead of: "Quantify biodiversity using species richness and abundance indices" Use: "Count how many different animals you see. Count how many of each type."

Visual Supports
- Vocabulary cards: Laminated cards with pictures and simple definitions
- Concept maps: Show links between ideas (e.g., "Hard engineering → protects people → harms wildlife")
- Colour-coded categories: Red = hard engineering, Blue = soft engineering, Green = managed retreat
- Photographs: Real images of habitats, species, and management structures
- Diagrams: Simplified, uncluttered diagrams with labels
- Timelines: Show coastal change over time (erosion, management, recovery)

Chunking & Scaffolding
- Break lessons into smaller steps: Instead of "design a coastal defence," do:
  a. Look at the problem (erosion, flooding)
  b. Choose a strategy (hard, soft, or both)
  c. Draw the defence
  d. Label the features
  e. Explain why it will work
- Provide templates: Pre-drawn outlines, partially completed diagrams, sentence starters
- Use concrete examples: "Here's a real sea wall. Here's what we're going to design."
- Repeat key concepts: Revisit hard vs. soft engineering, biodiversity, trade-offs multiple times

Alternatives to Writing
- Verbal responses: Pupils explain ideas aloud; scribe records
- Drawings/diagrams: Pupils draw instead of writing (e.g., design a sea wall, draw animals in habitats)
- Photographs: Pupils take photos instead of writing descriptions
- Sorting activities: Pupils sort cards (hard/soft engineering, biodiversity/low diversity)
- Role play: Pupils act out coastal processes (waves eroding, sediment moving, animals living in habitats)
- Video/audio recording: Pupils record explanations instead of writing

Section 6: SEND and Accessibility Guidance

Sensory Considerations

- Visual stress: Use pale backgrounds, sans-serif fonts, avoid clutter
- Colour blindness: Don't rely on colour alone (use patterns, labels, symbols)
- Auditory processing: Provide written instructions alongside verbal; allow extra processing time
- Tactile needs: Provide textured materials (sandpaper for erosion, fabric for vegetation)
- Proprioceptive needs: Allow movement breaks; use hands-on activities (modelling, handling specimens)
- Sensory sensitivities: Be aware of strong smells (seaweed, salt), textures, sounds; provide alternatives

Differentiation for SEND Learners

For pupils with moderate learning difficulties:

- Use simplified vocabulary and shorter sentences
- Provide visual supports and concrete examples
- Break tasks into smaller steps with clear instructions
- Offer pre-taught vocabulary and key concepts
- Use paired/group work for support
- Celebrate effort and progress, not just accuracy

For pupils with dyslexia:

- Use dyslexia-friendly fonts (sans-serif, larger size)
- Provide key vocabulary on cards
- Use colour overlays if helpful
- Allow extra time for reading and writing
- Offer alternatives to written recording (drawing, verbal, audio)
- Provide spell-checkers or scribe support

For pupils with autism/PDA:

- Provide clear, predictable routines
- Give advance notice of changes
- Offer choice where possible ("Would you prefer to draw or write?")
- Avoid demand-heavy language ("You must..." → "You could...")
- Provide quiet space if overwhelmed
- Be explicit about expectations and transitions

For pupils with physical disabilities:

- Ensure fieldwork locations are accessible
- Provide adapted equipment (larger pencils, clipboards with stands)
- Allow extra time for tasks
- Offer alternatives (virtual fieldwork, classroom-based activities)
- Ensure toilets and facilities are accessible
- Have a plan for mobility support if needed

For pupils with hearing impairments:

- Use visual supports (diagrams, photographs, captions)
- Provide written instructions
- Ensure good lighting for lip reading
- Use British Sign Language interpreter if needed
- Provide transcripts of videos

Section 6: SEND and Accessibility Guidance

For pupils with speech/language difficulties:

- Use visual supports and symbols
- Allow extra time to respond
- Accept non-verbal responses (pointing, drawing, gestures)
- Use Makaton or other communication systems if appropriate
- Reduce demand for verbal output

Section 7: Lesson Guides 7 and 8

Lesson 7: Fieldwork Preparation and Data Collection IOptional)

Learning Objective
Pupils will plan and conduct fieldwork to collect data on coastal habitats and management effectiveness using citizen science protocols.
Success Criteria

- I can identify hazards and plan safe fieldwork
- I can use quadrats and transects to collect biodiversity data
- I can record data accurately and consistently
- I can take photographs that document habitat features and species
- I can follow citizen science protocols

Starter
Activity: "Fieldwork Detectives"

- Show photographs of a coastal site (beach, rocky shore, saltmarsh)
- Pupils predict: "What animals and plants live here? How would you count them? What data would you collect?"
- Discuss: "Why is it important to collect data carefully? What could go wrong?"

Teacher Prompt: "Imagine you're a scientist. You need to collect data that another scientist could trust. What would you do?"

Main
Activity 1: Safety Planning

- Discuss coastal hazards: tides, rocks, currents, weather, allergies
- Identify risks at your specific site
- Brief pupils on safety rules:
  - Stay with a buddy; check in regularly
  - Wear appropriate clothing and footwear
  - Avoid deep water; stay within designated area
  - Report hazards to teacher immediately
  - Follow teacher instructions at all times
- Practise emergency procedures: whistle signals, meeting point, what to do if separated

Teacher Prompts:

- "What's the biggest hazard at our site? How will we manage it?"
- "What should you do if you feel cold or unwell?"
- "What's our emergency plan if the weather gets bad?"

Activity 2: Data Collection Training

- Explain quadrat method:
  - Place a 1m² quadrat on the ground
  - Count all species inside the quadrat
  - Record: species name, number of individuals, percentage cover
  - Take a photograph
  - Repeat in different locations
- Demonstrate on a practice area (classroom or school grounds):
  - Place quadrat; identify species together
  - Record data on sheet
  - Take photograph showing quadrat and species
  - Discuss: "Did we count everything? Are we sure about the species?"

Section 7: Lesson Guides 7 and 8

- Explain transect method (optional, for linear features like a beach profile):
  - Walk a line from sea to land
  - Record species at regular intervals
  - Measure height/distance
  - Note changes in habitat
- Practise using equipment:
  - Hand lenses (look closely at small organisms)
  - Identification guides (match organisms to pictures)
  - Measuring tapes (measure distances, sizes)
  - Clipboards (keep data sheets dry)

Teacher Prompts:

- "Why do we use a quadrat? Why not just count all the animals?"
- "What if you're not sure what a species is? What do you do?"
- "Why take a photograph? What does it show?"

Activity 3: Data Recording & Quality

- Show a completed data sheet; explain each field:
  - Location: Where is the quadrat? (GPS, map reference, description)
  - Date/Time: When did you collect data? (important for tide-dependent habitats)
  - Weather: What was the weather like? (affects animal behaviour)
  - Species: What did you find? (use identification guide)
  - Abundance: How many? (count individuals or estimate percentage cover)
  - Photograph: Visual record of the quadrat
  - Observer notes: Anything unusual? Damage? Disturbance?
- Discuss data quality:
  - Accuracy: "Are your measurements precise? Did you identify species correctly?"
  - Consistency: "Did you use the same method in all locations?"
  - Completeness: "Did you fill in all fields?"
  - Verification: "Could another person repeat your study and get similar results?"
- Practise recording data on a sample sheet using classroom observations

Key Misconceptions to Address:

- "We need to count every animal on the beach." → Quadrats let us sample and estimate total numbers
- "If we're not sure about a species, we can guess." → We should use guides or ask an expert; guessing ruins data quality
- "It doesn't matter if we use different methods in different locations." → Consistency is essential for comparing data

Section 7: Lesson Guides 7 and 8

Fieldwork Activity

On-Site Fieldwork

Arrival & Safety Briefing

- Check weather and tide times
- Brief pupils on hazards and safety rules
- Establish buddy system and check-in procedures
- Point out boundaries and safe area

Habitat Exploration

- Walk around the site
- Pupils observe: "What habitats do you see? What animals and plants?"
- Discuss: "Where should we place our quadrats? Why?"
- Identify 3–5 sampling locations (e.g., sea wall, rocky shore, saltmarsh, beach)

Data Collection

- Divide class into groups (3–4 pupils per group)
- Each group collects data from one habitat using quadrats
- Groups rotate to collect data from multiple habitats
- Teacher circulates to check data quality and answer questions
- Pupils photograph each quadrat and record observations

Reflection & Wrap-Up

- Gather class together
- Discuss observations: "What did you find? Were you surprised?"
- Discuss challenges: "What was difficult? What would you change?"
- Collect data sheets and equipment

Debrief on safety: "Did everyone stay safe? What went well?"

- Classroom Alternative (Virtual or Simulated Fieldwork):
- Use Google Street View to explore a coastal site
- Examine provided photographs of habitats and species
- Complete data recording sheets using images
- Discuss: "What can we learn from photographs? What can't we see?"
- Compare data from different locations

Section 7: Lesson Guides 7 and 8

Lesson 8: Fieldwork Analysis and Reflection

Learning Objective
Pupils will analyse collected data, reflect on management effectiveness, and draw conclusions about coastal habitats.
Success Criteria

- I can analyse biodiversity data (calculate species richness, compare habitats)
- I can interpret data in relation to coastal management
- I can reflect on fieldwork methods and data quality
- I can draw evidence-based conclusions

Starter
Activity: “Data Detective"

- Display a sample data table from fieldwork
- Pupils examine: "Which habitat had the most species? Which had the most animals? Why?"
- Discuss: "What does this data tell us about coastal management?"

Teacher Prompt: "Our data shows that the rocky shore has more species than the sea wall. Why might that be?"

Main
Activity 1: Data Analysis

- Compile class data into a summary table:
  - Rows: different habitats (sea wall, rocky shore, saltmarsh, beach)
  - Columns: species found, total abundance, species richness
- Calculate simple statistics:
  - Species richness: Count the number of different species in each habitat
  - Total abundance: Count total number of individuals in each habitat
  - Average abundance per species: Total abundance ÷ species richness
- Create a bar chart or graph showing species richness in different habitats
- Discuss patterns: "Which habitat has the most species? Why?"

Teacher Prompts:

- "Why do you think the rocky shore has more species than the sea wall?"
- "What does high biodiversity tell us about a habitat?"
- "How does coastal management affect biodiversity?"

Activity 2: Interpretation & Conclusions

- Use workbook pages to guide reflection:
  - "How does the shape of the land affect management strategies?"
  - "How does management affect wildlife?"
  - "What management strategy would you recommend for this coast? Why?"
- Link data to learning:
  - "Our data shows X species on the sea wall and Y species on the rocky shore. This supports the idea that natural habitats have higher biodiversity than man-made structures."

Section 7: Lesson Guides 7 and 8

- Discuss management implications:
  - "If we want to protect biodiversity, what should we do?"
  - "How could we improve the sea wall to support more wildlife?"

Activity 3: Fieldwork Reflection
- Pupils complete reflection questions:
  - "What did you learn from fieldwork?"
  - "What was challenging? What went well?"
  - "How would you improve your data collection next time?"
  - "What surprised you?"
- Discuss as a class:
  - "Did the data match your predictions?"
  - "What would you do differently next time?"
  - "How could we use this data to improve coastal management?"

Key Misconceptions to Address:
- "Our data is wrong because we didn't count every animal." → Quadrat sampling is a valid method; it gives us reliable estimates
- "The sea wall is bad because it has fewer species." → It's designed to protect people, not wildlife; we can improve it with enhancements
- "We should remove all sea walls and create natural habitats." → We need both protection and nature; integrated management is best

Differentiation
Support:
- Provide a partially completed data table with some calculations done
- Use simplified analysis: "Count the species. Which habitat has the most?"
- Offer sentence starters: "The data shows... This means... We should..."
- Pair pupils for analysis; scribe for writing difficulties
- Use visual representations (bar charts, photographs) alongside written analysis

Challenge:
- Ask pupils to calculate more complex statistics (species diversity indices, standard deviation)
- Extend: "Compare your data to published research. Are your results similar?"
- Ask pupils to design a follow-up study: "What would you investigate next?"
- Debate: "Should we prioritise protecting people or wildlife? How do we balance both?"

Assessment Opportunities
Quick Checks:
- Can pupils calculate species richness from data?
- Do they understand the link between habitat type and biodiversity?
- Can they interpret data in relation to coastal management?

Exit Ticket Prompts:
- "Which habitat had the most species? Why?"
- "How does coastal management affect wildlife?"
- "What would you recommend to improve coastal management at our site?"

Section 7: Example Answer Sheet and Extensions

Lesson 1: UK Coastal Topography & Relief Maps
Expected Responses:
Label key coastal features

- Students should identify: headlands, bays, cliffs, beaches, spits, bars (depending on the specific map)
- Relief maps should show contour lines with labels indicating height and slope steepness

Coastal risk assessment

- Areas at high risk: steep cliffs (close contours), low-lying coasts (gentle relief), areas with soft rock
- Examples: Holderness coast (erosion rates), East Anglia (flooding risk), Cornish cliffs (unstable)
- Reasons: rock type, wave exposure, human activity, climate change

Model Answer: "The Holderness coast is at high risk from erosion because:

- The rocks are soft (clay and chalk) and erode quickly
- The coast is exposed to waves from the North Sea
- There's no natural protection (no headlands or offshore bars)
- Sea level is rising due to climate change
- The area is subsiding (sinking) due to geological processes"

Lesson 2: Coastal Landforms in Detail
Expected Responses:
Cliff formation diagram

- Wave-cut notch: formed by waves hitting the cliff base and breaking it apart
- Weathering: rain, frost, salt spray breaking down rocks above the notch
- Rockfall: when the cliff becomes unstable and collapses
- The cycle repeats, and the cliff retreats inland

Beach and spit formation

- Beaches form where waves deposit sediment (sand, pebbles)
- Spits form where sediment is carried along the coast and deposited at a point (e.g., where a bay widens)
- Bars form when a spit closes off a bay, creating a lagoon

Model Answer: "Spits form over many years through the following process:

- Waves carry sediment (sand, pebbles) along the coast
- When the coast changes direction (e.g., at a headland), the sediment can't go further
- It's deposited in the sea, building out from the shore
- The spit grows longer and longer, sometimes curving back to the shore
- Eventually, it may close off a bay, creating a bar and lagoon
- Examples: Spurn Head (Humber), Orfordness (Suffolk), Dawlish Warren (Devon)"

Lesson 3: Coastal Management Strategies
Expected Responses:
Hard engineering comparison

- Sea wall: protects land, reflects waves, expensive, harms wildlife, can fail
- Groyne: traps sediment, builds beaches, can cause erosion elsewhere, ugly
- Breakwater: reduces wave energy, expensive, can trap sediment, affects water flow
- Rip-rap: absorbs wave energy, cheaper than sea walls, less effective, can be unstable

Section 7: Example Answer Sheet and Extensions

Soft engineering comparison

- Beach nourishment: cheaper initially, sustainable, helps wildlife, requires maintenance
- Saltmarsh creation: provides habitat, slows waves, sustainable, takes time to establish
- Dune restoration: protects coast, provides habitat, sustainable, limited effectiveness
- Managed retreat: sustainable, creates habitat, controversial, people lose land

Model Answer: "Hard engineering is better for immediate protection because:

- It's effective at stopping erosion and flooding
- It provides visible, tangible protection
- It can last 30+ years However, soft engineering is better for long-term sustainability because:
- It works with nature instead of against it
- It provides wildlife habitat
- It's cheaper long-term
- It's more sustainable as climate changes The best approach is integrated coastal zone management: use hard engineering where people need protection, and soft engineering where we can create habitat."

Lesson 4: Man-Made vs. Natural Habitats
Expected Responses:

Feature	Man-Made (Sea Wall)	Natural (Rocky Shore)
Surface	Smooth concrete	Rough, varied texture
Shelter	None (no crevices)	Lots (crevices, pools, under rocks)
Food	None (no algae, invertebrates)	Lots (algae, invertebrates, detritus)
Species diversity	Low (few species)	High (many species)
Ecosystem services	None	Water filtration, food production, carbon storage

Model Answer: "Natural habitats support more biodiversity than man-made structures because:

- They have varied structure (rocks, crevices, pools) that provides shelter
- They have food sources (algae, invertebrates, detritus)
- They have gradual changes in conditions (water level, salinity, light) that suit different species
- They've evolved over thousands of years to support diverse communities Man-made structures like sea walls are smooth and uniform, with no food or shelter, so few species can live there."

Section 7: Example Answer Sheet and Extensions

Lesson 5: Ecological Enhancement & Design

Expected Responses:

Ecological enhancement strategies

- Eco-tiles: textured tiles on sea walls, create habitat for invertebrates and fish
- Saltmarsh creation: plant salt-tolerant vegetation, slow waves, trap sediment, provide habitat
- Oyster reefs: restore native oysters, filter water, provide habitat
- Seagrass meadows: underwater meadows for fish nurseries
- Dune restoration: protect and restore dunes for plants and birds

Design a sea wall with enhancements

Model Answer: "My design includes:

- A traditional sea wall to protect the town from flooding
- Eco-tiles on the wall surface (textured, with crevices) to provide habitat for crabs, fish, and invertebrates
- A saltmarsh in front of the wall (where possible) to slow waves, trap sediment, and provide fish nursery habitat
- Native plants (salt-marsh cordgrass, sea aster) to stabilise sediment and provide food
- Rock pools created by the eco-tiles to provide refuge for small animals

This design protects people AND wildlife because:

- The sea wall stops flooding
- The eco-tiles and saltmarsh provide habitat
- Fish can use the saltmarsh as a nursery
- Invertebrates and birds can live on the tiles
- Water quality improves as plants filter sediment
- The coast is more resilient (multiple lines of defence)"

Lesson 6: Critical Thinking & Debate

Expected Responses:

Trade-off analysis

Hard Engineering Argument: "We should use hard engineering because:

- It's the most effective at protecting people
- It provides immediate protection
- It can last 30+ years
- Homes and businesses are at risk
- We have a responsibility to protect people"

Soft Engineering Argument: "We should use soft engineering because:

- It's sustainable and works with nature
- It's cheaper long-term
- It provides wildlife habitat
- It improves water quality and resilience
- It's better for the environment"

Managed Retreat Argument: "We should use managed retreat because:

- It's the most sustainable approach
- It adapts to climate change
- It creates space for nature
- It's cheaper than defending everywhere
- It's inevitable as sea level rises"

Section 7: Example Answer Sheet and Extensions

Model Answer: "The best approach depends on the situation:

- In cities with many homes, we need hard engineering (sea walls, barriers) to protect people
- In areas with less development, we should use soft engineering (saltmarsh, dunes) to protect nature
- In the long term, we need to adapt to climate change through managed retreat in some areas
- The best solution is integrated coastal zone management: use all three approaches together
- Communities should be involved in decisions because they're affected by the outcome"

Section 7: Extension and Enrichment Activities

Cross-Curricular Extensions

Design & Technology: Model Coastal Defences

- Pupils design and build a model sea wall using craft materials
- Test it with water to see if it protects a "town" (sandpit with buildings)
- Modify the design based on results
- Add ecological enhancements (eco-tiles, vegetation)
- Compare different designs: which is most effective? Most sustainable?

Mathematics: Data Handling & Statistics

- Analyse fieldwork data using spreadsheets
- Calculate mean, median, mode, range for species abundance
- Create graphs and charts showing biodiversity patterns
- Compare data from different habitats using statistical tests
- Calculate cost-effectiveness of different management strategies

English: Persuasive Writing & Debate

- Write a persuasive letter to the council arguing for a specific coastal management strategy
- Create a poster campaign promoting coastal conservation
- Write a newspaper article about a coastal management project
- Conduct a formal debate on coastal management trade-offs
- Write a case study of a real coastal management decision

Citizenship & PSHE: Values & Decision-Making

- Discuss: "Who should make decisions about coastal management? Scientists? Politicians? Communities?"
- Debate: "Is it fair to spend millions protecting a few homes? What about protecting nature?"
- Explore: "How do we balance protecting people with protecting nature?"
- Investigate: "What do local communities think about coastal management? Survey them."
- Reflect: "What's my responsibility to future generations? To wildlife?"

Geography: Regional Case Studies

- Research a specific UK coast (e.g., Holderness, Thames Estuary, Cornish coast)
- Investigate the geology, management strategies, and outcomes
- Compare different coasts and their management approaches
- Evaluate: "Which approach is most successful? Why?"
- Present findings to the class

Science: Ecology & Biodiversity

- Study food webs in coastal habitats
- Investigate how pollution affects coastal ecosystems
- Research invasive species and their impact
- Explore climate change impacts on coastal habitats
- Design a conservation strategy for a threatened species

Section 7: Extension and Enrichment Activities

Home Learning/Family Engagement

Activity 1: "Take It to Your Local Coast"

- Visit a local beach, river, or pond with family
- Collect data using the same methods as fieldwork (quadrat, transect)
- Record observations: "What animals and plants did you see? What management is in place?"
- Compare to classroom fieldwork: "Is it similar or different? Why?"
- Write a short report: "What did you learn? What surprised you?"

Activity 2: "Coastal Management Detective"

- Research a coastal management project near your home (or anywhere in the UK)
- Find out: What was the problem? What solution was used? What were the results?
- Create a poster or presentation explaining the project
- Evaluate: "Was it successful? What would you change?"
- Share with the class

Activity 3: "Design Your Own Coastal Defence"

- Imagine your town is eroding
- Design a coastal management strategy using hard engineering, soft engineering, or both
- Draw or model your design
- Explain: "Why will this work? How does it help wildlife?"
- Present to family; get their feedback

Activity 4: "Coastal Careers Exploration"

- Research careers related to coastal management (geomorphologist, environmental consultant, coastal engineer, conservationist)
- Interview someone in a coastal-related job (if possible)
- Create a "career profile" poster
- Discuss: "What qualifications do they need? What's interesting about the job?"

Activity 5: "Citizen Science Contribution"

- Join a citizen science project monitoring coastal change (e.g., iNaturalist, Concrete Coast monitoring)
- Contribute observations from your local coast
- Track your contributions over time
- Reflect: "How does citizen science help conservation?"

Family Engagement

Newsletter/Blog Post: "This term, we've been learning about coastal management and ecological enhancement. Your child has collected real data from a coastal site and designed a sea wall with wildlife benefits. Here are some ways you can support their learning at home:

- Visit a local beach or river together
- Discuss: 'How is this coast managed? What wildlife lives here?'
- Help them research a coastal management project
- Encourage them to contribute to citizen science projects
- Ask them to explain what they've learned about hard vs. soft engineering"

Section 7: Extension and Enrichment Activities

Family Activity Pack:

- "Coastal Topography Hunt": Find coastal features near your home (cliffs, beaches, spits, bars)
- "Habitat Spotting": Observe wildlife in different habitats; compare biodiversity
- "Management Detective": Identify coastal defences in your area; discuss their pros and cons
- "Design Challenge": Design a coastal defence that protects people AND wildlife
- "Citizen Science": Contribute observations to a monitoring project

Reflection Prompts for Families:

- "What's your favourite coastal habitat? Why?"
- "If your town was eroding, what would you do to protect it?"
- "How do we balance protecting people with protecting nature?"
- "What can we do to help coastal conservation?"