Physical World Subject Knowledge Organiser :

How natural processes form beautiful landscapes looking at arid, glacial and fluvial processes and how humans interact with these.

Types of Erosion

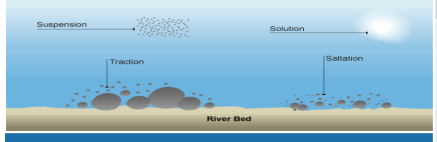
The break down and transport of rocks – smooth, round and sorted.

Attrition	Rocks that bash together to become smooth/smaller.
Solution	A chemical reaction that dissolves rocks.
Abrasion	Rocks hurled at the base of a cliff to break pieces apart or scraped against the banks and bed of a river.
Hydraulic Action	Water enters cracks in the cliff, or river bank, air compresses, causing the crack to expand.

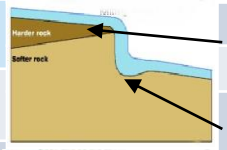
Types of Transportation

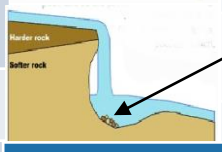
A natural process by which eroded material is carried/transported.

Solution	Minerals dissolve in water and are carried along.
Suspension	Sediment is carried along in the flow of the water.
Saltation	Pebbles that bounce along the sea/river bed.
Traction	Boulders that roll along a river/sea bed by the force of the flowing water.



Formation of a Waterfall





1) River flows over alternative types of rocks.

2) River erodes soft rock faster creating a step.

3) Further hydraulic action and abrasion form a plunge pool beneath.

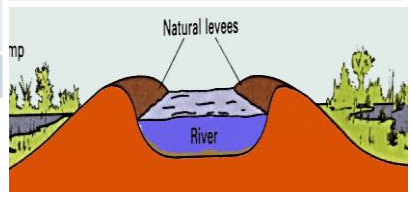
4) Hard rock above is undercut leaving cap rock which collapses providing more material for erosion.

5) Waterfall retreats leaving steep sided gorge.

Formation of Floodplains and levees

When a river floods, fine silt/alluvium is deposited on the valley floor. Closer to the river's banks, the heavier materials build up to form natural levees.

- ✓ Nutrient rich soil makes it ideal for farming.
- ✓ Flat land for building houses.



Types of Weathering

Weathering is the breakdown of rocks where they are.

Chemical	Breakdown of rock by changing its chemical composition. e.g. dissolving limestone.
Mechanical	Breakdown of rock without changing its chemical composition e.g. freeze thaw

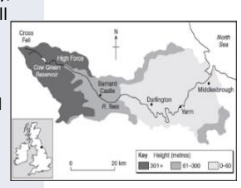
What is Deposition?

When the sea or river loses energy, it drops the sand, rock particles and pebbles it has been carrying. This is called deposition. Heaviest material is deposited first.

Case Study: The River Tees

Location and Background
Located in the North of England and flows 137km from the Pennines to the North Sea at Red Car.

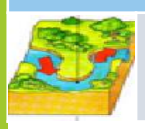
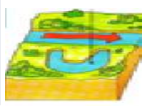
Geomorphic Processes
Upper – Features include V-Shaped valley, rapids and waterfalls. Highforce Waterfall drops 21m and is made from harder Whinstone and softer limestone rocks. Gradually a gorge has been formed.
Middle – Features include meanders and ox-bow lakes. The meander near Yarm encloses the town.
Lower – Greater lateral erosion creates features such as floodplains & levees. Mudflats at the river's estuary.



Physical and Human Causes of Flooding.

***Physical:* Prolong & heavy rainfall** Long periods of rain causes soil to become saturated leading runoff.	***Physical:* Geology** Impermeable rocks causes surface runoff to increase river discharge.
***Physical:* Relief** Steep-sided valleys channels water to flow quickly into rivers causing greater discharge.	***Human:* Land Use** Tarmac and concrete are impermeable. This prevents infiltration & causes surface runoff.

Formation of Ox-bow Lakes

Step 1	Step 2
 Erosion of outer bank forms river cliff. Deposition inner bank forms slip off slope.	 Further hydraulic action and abrasion of outer banks, neck gets smaller.
Step 3	**Step 4**
 Erosion breaks through neck, so river takes the fastest route, redirecting flow	 Evaporation and deposition cuts off main channel leaving an oxbow lake.

Upper Course of a River

Near the source, the river flows over steep gradient from the hill/mountains. This gives the river a lot of energy, so it will erode the riverbed vertically to form narrow valleys.

Middle Course of a River

Here the gradient get gentler, so the water has less energy and moves more slowly. The river will begin to erode laterally making the river wider.

Lower Course of a River

Near the river's mouth, the river widens further and becomes flatter. Material transported is deposited.

River Management Schemes

Soft Engineering	Hard Engineering
Afforestation – plant trees to soak up rainwater, reduces flood risk. **Demountable Flood Barriers** put in place when warning raised. **Managed Flooding** – naturally let areas flood, protect settlements.	**Straightening Channel** – increases velocity to remove flood water. **Artificial Levees** – heightens river so flood water is contained. **Deepening or widening river** to increase capacity for a flood.

Geographical Vocabulary

- ❑ **Source:** Where a river begins.
- ❑ **Mouth:** Where a river ends by merging into the sea/a lake/ body of water.
- ❑ **Erosion:** The geological process in which materials are worn away and transported by natural forces such as wind or water. Vertical is up and down, lateral is to the sides.
- ❑ **Deposition:** The geological process in which sediments, soil and rocks are added to a landform or land mass.
- ❑ **Hydraulic action**: A process of erosion which is provided by the force of water.
- ❑ **Abrasion**: A process of erosion where the river rubs stones that are being transported against the bed of a river thereby breaking it down.
- ❑ **Weathering**: Describes the breaking down or dissolving of rocks and minerals on the surface of the Earth.
- ❑ **Hard engineering techniques:** Using artificial structures to prevent or control flooding. They are usually expensive methods but they allow for big environmental improvements and financial savings.
- ❑ **Soft engineering techniques:** Natural processes which manage the flood risk, accepting that floods will occur. They aim to reduce and slow movement of water into a river channel to help reduce flood risk.
- ❑ **Risk:** A situation involving exposure to danger.
- ❑ **Flood probability:** The chance of a flood of a certain size occuring in any given year.
- ❑ **Environment Agency:** The Environment Agency is a non-departmental public body, established in 1995 with responsibilities relating to the protection and enhancement of the environment in England.
- ❑ **Runoff:** The draining away of water-generally towards a river or water source.

Skills and Enquiry

Describing river characteristics and landforms and geographical regions using a variety of different maps, explaining the physical processes involved in river feature formation. You should be able to review the changing physical landscapes created over time with discussion of the role of erosion, transport and deposition processes. Compare and reflect upon urban and rural challenges created through the impacts of small and larger-scale flood events. Understand and interpret photographs and maps of physical features. Extended writing. Analyse different graphs and charts to find evidence that supports your views regarding flood management. Carry out data analysis and data manipulation to analyze key charts and graphs.

The St Benet Biscop Geographer

It is important that we are aware of and understand the issues and challenges faced in our natural physical environment. This allows us to have an appreciation for the wider world we live in, which we should strive to support and develop at all times. We are part of a global community, that we should show stewardship for. You need to be aware of conflicting sides of arguments for topical issues such as flooding and flood management and sustainable development in order to discuss potential solutions. By studying the physical landscapes at a local level you will gather an appreciation for issues faced by individuals, to reiterate the premise that challenges are in a range of areas with different socio-economic contexts. You will respect and understand the challenges faced by communities in different contexts from previous units of study.