Geography- Year 10 Knowledge Organiser – Tectonic Hazards

The structure of the Earth

The Crust	Varies in thickness (5-10km) beneath the ocean. Made up of several large plates.
The Mantle	Widest layer (2900km thick). The heat and pressure means the rock is in a liquid state that is in a state of convection.
The Inner and outer Core	Hottest section (5000 degrees). Mostly made of iron and nickel and is 4x denser than the crust. Inner section is solid whereas outer layer is liquid.

Convection Currents

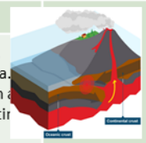
The crust is divided into tectonic plates which are moving due to convection currents in the mantle.

1. Radioactive decay of some of the elements in the core and mantle generate a lot of heat.
2. When lower parts of the mantle molten rock (Magma) heat up they become **less dense** and **slowly rise**.
3. As they move towards the top they cool down, become **more dense** and **slowly sink**.
4. These **circular movements** of semi-molten rock are **convection currents**
5. Convection currents create **drag** on the base of the tectonic plates and this causes them to move.

Types of Plate Margins

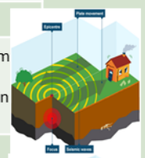
Destructive Plate Margin

When the denser plate subducts beneath the other, friction causes it to melt and become molten magma. The magma forces its ways up to the surface to form a volcano. This margin is also responsible for devastating earthquakes.



Constructive Plate Margin

Here two plates are moving apart causing new magma to reach the surface through the gap. Volcanoes formed along this crack cause a submarine mountain range such as those in the Mid Atlantic Ridge.

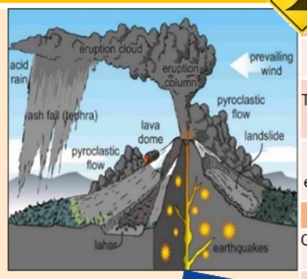


Conservative Plate Margin

A conservative plate boundary occurs where plates slide past each other in opposite directions, or in the same direction but at different speeds. This is responsible for earthquakes such as the ones happening along the San Andreas Fault, USA.

Volcanic Hazards

Ash cloud	Small pieces of pulverised rock and glass which are thrown into the atmosphere.
Gas	Sulphur dioxide, water vapour and carbon dioxide come out of the volcano.
Lahar	A volcanic mudflow which usually runs down a valley side on the volcano.
Pyroclastic flow	A fast moving current of super-heated gas and ash (1000°C). They travel at 450mph.
Volcanic bomb	A thick (viscous) lava fragment that is ejected from the volcano.



LIC -CS: Haiti Earthquake 2010

Causes
On a conservative plate margin, involving the Caribbean & North American plates.
The magnitude 7.0 earthquake was only 15 miles from the capital Port au Prince.
With a very shallow focus of 13km deep.

Effects
230,000 people died and 3 million affected. Many emotionally affected.
250,000 homes collapsed or were damaged. Millions homeless.
Rubble blocked roads and shut down ports.

Management
Individuals tried to recover people.
Many countries responded with appeals or rescue teams.
Heavily relied on international aid, e.g. $330 million from the EU.
98% of rubble remained after 6 months.

Tectonic Hazards

AQA

The Challenges of Natural Hazards

What is a Natural Hazard

A natural hazard is a natural process which could cause death, injury or disruption to humans, property and possessions.

Geological Hazard	Meteorological Hazard
These are hazards caused by land and tectonic processes.	These are hazards caused by weather and climate.

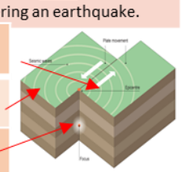
Causes of Earthquakes

Earthquakes are caused when two plates become **locked** causing **friction** to build up. From this **stress**, the **pressure** will eventually be released, triggering the plates to move into a new position. This movement causes energy in the form of **seismic waves**, to travel from the **focus** towards the **epicentre**. As a result, the crust vibrates triggering an earthquake.

The point directly above the focus, where the seismic waves reach first, is called the EPICENTRE.

SEISMIC WAVES (energy waves) travel out from the focus.

The point at which pressure is released is called the FOCUS.



Managing Volcanic Eruptions

Warning signs	Monitoring techniques
Small earthquakes are caused as magma rises up.	Seismometers are used to detect earthquakes.
Temperatures around the volcano rise as activity increases.	Thermal imaging and satellite cameras can be used to detect heat around a volcano.
When a volcano is close to erupting it starts to release gases.	Gas samples may be taken and chemical sensors used to measure sulphur levels.

Preparation	
Creating an exclusion zone around the volcano.	Being ready and able to evacuate residents.
Having an emergency supply of basic provisions, such as food	Trained emergency services and a good communication system.

Earthquake Management

PREDICTING

Methods include:
- Satellite surveying (tracks changes in the earth's surface)
- Laser reflector (surveys movement across fault lines)
- Radon gas sensor (radon gas is released when plates move so this finds that)
- Seismometer
- Water table level (water levels fluctuate before an earthquake).
- Scientists also use seismic records to predict when the next event will occur.

PROTECTION

You can't stop earthquakes, so earthquake-prone regions follow these three methods to reduce potential damage:
- Building earthquake-resistant buildings
- Raising public awareness
- Improving earthquake prediction

Project

Research a recent Volcanic eruption and produce a fact file about it. Make sure you include information on location, date, time, length of eruption & type of volcano. **You can do this digitally or on paper but you must submit this as a printed piece of work. Also include:**

Effects
Detail all the effects of the eruption. Make sure you include both short/long & primary/secondary impacts, whether effects would have been as bad if country was a HIC/LIC and did any effects impact other countries?

Management
What methods of prediction and warnings were in place? How effective were they and could these be improved? Was there any management needed outside of the country the eruption took place in?

Geography 10 Knowledge Organiser – Climatic Hazards

Global pattern of air circulation

Atmospheric circulation is the large-scale movement of air by which heat is distributed on the surface of the Earth.

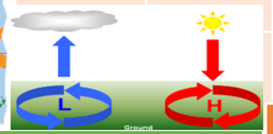
Hadley cell	Largest cell which extends from the Equator to between 30° to 40° north & south.
Ferrell cell	Middle cell where air flows poleward between 60° & 70° latitude.
Polar cell	Smallest & weakness cell that occurs from the poles to the Ferrell cell.

Distribution of Tropical Storms.

They are known by many names, including hurricanes (North America), cyclones (India) and typhoons (Japan and East Asia). They all occur in a band that lies roughly 5-15° either side of the Equator.

High and Low Pressure

Low Pressure	High Pressure
Caused by hot air rising. Causes stormy, cloudy weather.	Caused by cold air sinking. Causes clear and calm weather.



Formation of Tropical Storms

1	The sun's rays heats large areas of ocean in the summer and autumn. This causes warm, moist air to rise over the particular spots
2	Once the temperature is 27°, the rising warm moist air leads to a low pressure. This eventually turns into a thunderstorm. This causes air to be sucked in from the trade winds.
3	With trade winds blowing in the opposite direction and the rotation of earth involved (Coriolis effect), the thunderstorm will eventually start to spin.
4	When the storm begins to spin faster than 74mph, a tropical storm (such as a hurricane) is officially born.
5	With the tropical storm growing in power, more cool air sinks in the centre of the storm, creating calm, clear condition called the eye of the storm.
6	When the tropical storm hits land, it loses its energy source (the warm ocean) and it begins to lose strength. Eventually it will 'blow itself out'.

Management of Tropical Storms

Protection
Preparing for a tropical storm may involve construction projects that will improve protection.

Aid
Aid involves assisting after the storm, commonly in LIDs.

Development
The scale of the impacts depends on the whether the country has the resources cope with the storm.

Planning
Involves getting people and the emergency services ready to deal with the impacts.

Prediction
Constant monitoring can help to give advanced warning of a tropical storm

Education
Teaching people about what to do in a tropical storm.

Climatic Hazards

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The Challenges of Natural Hazards

Primary Effects of Tropical Storms

- The intense winds of tropical storms can destroy whole **communities, buildings** and **communication networks**.
- As well as their own destructive energy, the winds can generate abnormally high waves called **storm surges**.
- Sometimes the most destructive elements of a storm are these subsequent **high seas and flooding** they cause to coastal areas.

Secondary Effects of Tropical Storms

- People are **left homeless**, which can cause distress, poverty and ill health due to lack of shelter.
- **Shortage of clean water** and **lack of proper sanitation** makes it easier for diseases to spread.
- **Businesses are damaged** or destroyed causing employment.
- Shortage of food as **crops are damaged**.

Case Study Project

Research a recent Tropical Storm and produce a case study about it. Make sure you include information on location, date, path, strength, formation. DO NOT DO Typhoon Haiyan. **You can do this digitally or on paper but submit this as a printed piece of work. Also include:**.

Effects
- Almost 6,500 deaths.
- 130,000 homes destroyed.
- Water and sewage systems destroyed had caused diseases.
- Emotional grief for dead.

Management
- The UN raised £190m in aid.
- USA & UK sent helicopter carrier ships deliver aid remote areas.
- Education on typhoon preparedness.

Case Study: UK Heat Wave 2003

Causes
The heat wave was caused by an anticyclone (areas of high pressure) that stayed in the area for most of August. This blocked any low pressure systems that normally brings cooler and rainier conditions.

Effect
- People suffered from heat strokes and dehydration.
- 2000 people died from causes linked to heatwave.
- Rail network disrupted and crop yields were low.

Management
- The NHS and media gave guidance to the public.
- Limitations placed on water use (hose pipe ban).
- Speed limits imposed on trains and government created 'heatwave plan'.

What is Climate Change?

Climate change is a large-scale, long-term shift in the planet's weather patterns or average temperatures. Earth has had tropical climates and ice ages many times in its 4.5 billion years.

Recent Evidence for climate change.

Global temperature	Average global temperatures have increased by more than 0.6°C since 1950.
Ice sheets & glaciers	Many of the world's glaciers and ice sheets are melting. E.g. the Arctic sea ice has declined by 10% in 30 years.
Sea Level Change	Average global sea level has risen by 10-20cms in the past 100 years. This is due to the additional water from ice and thermal expansion.

Enhanced Greenhouse Effect

Recently there has been an increase in **humans burning fossil fuels** for energy. These fuels (gas, coal and oil) emit **greenhouse gases**. This is making the Earth's atmosphere thicker, therefore trapping more solar radiation and causing **less to be reflected**. As a result, the Earth is becoming warmer.

Evidence of natural change

Orbital Changes	Some argue that climate change is linked to how the Earth orbits the Sun, and the way it wobbles and tilts as it does it.
Sun Spots	Dark spots on the Sun are called Sun spots. They increase the amount of energy Earth receives from the Sun.
Volcanic Eruptions	Volcanoes release large amounts of dust containing gases. These can block sunlight and results in cooler temperatures.

Managing Climate Change

Carbon Capture
This involves new technology designed to reduce climate change.

Planting Trees
Planting trees increase the amount of carbon is absorbed from atmosphere.

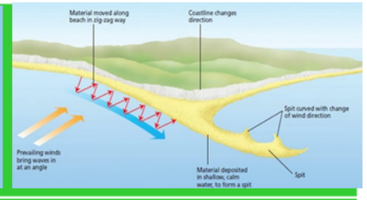
International Agreements
Countries aim to cut emissions by signing international deals and by setting targets.

Renewable Energy
Replacing fossil fuels based energy with clean/natural sources of energy.

Geography 10 Knowledge Organiser – Coasts

Formation of Coastal Spits - Deposition

Example: Spurn Head, Holderness Coast.



1) Swash moves up the beach at the angle of the prevailing wind.
2) Backwash moves down the beach at 90° to coastline, due to gravity.
3) Zigzag movement (Longshore Drift) transports material along beach.
4) Deposition causes beach to extend, until reaching a river estuary.
5) Change in prevailing wind direction forms a hook.
6) Sheltered area behind spit encourages deposition, salt marsh forms.

How do waves form?

Waves are created by wind blowing over the surface of the sea. As the wind blows over the sea, friction is created - producing a swell in the water.

Why do waves break?

1	Waves start out at sea.
2	As waves approaches the shore, friction slows the base.
3	This causes the orbit to become elliptical.
4	Until the top of the wave breaks over.

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.
Hydraulic Action	Water enters cracks in the cliff, air compresses, causing the crack to expand.

Types of Weathering

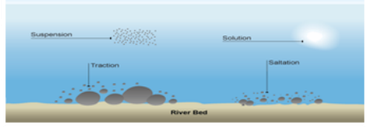
Weathering is the breakdown of rocks where they are.

Carbonation	Breakdown of rock by changing its chemical composition.
Mechanical	Breakdown of rock without changing its chemical composition.

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.



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.

Mass Movement

A large movement of soil and rock debris that moves down slopes in response to the pull of gravity in a vertical direction.

1	Rain saturates the permeable rock above the impermeable rock making it heavy.
2	Waves or a river will erode the base of the slope making it unstable.
3	Eventually the weight of the permeable rock above the impermeable rock weakens and collapses.
4	The debris at the base of the cliff is then removed and transported by waves or river.

AQA

Physical Landscapes in the UK

Formation of Bays and Headlands

1) Waves attack the coastline.
2) Softer rock is eroded by the sea quicker forming a bay, calm area cases deposition.
3) More resistant rock is left jutting out into the sea. This is a headland and is now more vulnerable to erosion.

Project

Research a section of UK coastline that is under threat . Examine how the coast is being threatened, the underlying geology and what short and long term impacts will affect it. **You can do this digitally or on paper but you must submit this as a printed piece of work. Also include:**

Background
How has this area of coast been formed? What is threatened and how will it impact the local community? What measures have already been put in place? Are they effective?

Management
What solutions are being used to help solve these problems? What solutions could they use? Is the cost of these solutions worth the benefit? Why?

Mechanical Weathering Example: Freeze-thaw weathering

Stage One
Water seeps into cracks and fractures in the rock.

Stage Two
When the water freezes, it expands about 9%. This wedges apart the rock.

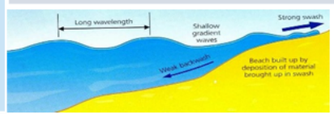
Stage Three
With repeated freeze-thaw cycles, the rock breaks off.

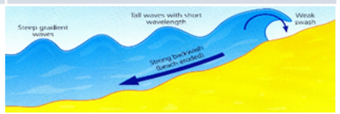
Size of waves

- Fetch how far the wave has travelled
- Strength of the wind.
- How long the wind has been blowing for.

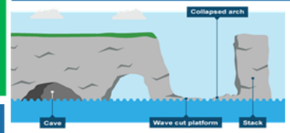
Types of Waves

Constructive Waves	Destructive Waves
This wave has a **swash that is stronger** than the backwash. This therefore builds up the coast.	This wave has a **backwash that is stronger** than the swash. This therefore erodes the coast.





Formation of Coastal Stack



Example: Old Harry Rocks, Dorset

1) Hydraulic action widens cracks in the cliff face over time.
2) Abrasion forms a wave cut notch between HT and LT.
3) Further abrasion widens the wave cut notch to from a cave.
4) Caves from both sides of the headland break through to form an arch.
5) Weather above/erosion below –arch collapses leaving stack.
6) Further weathering and erosion eaves a stump.

Geography 10 Knowledge Organiser – Rivers & Coasts

Coastal Defences

Hard Engineering Defences

Groynes	Wood barriers prevent longshore drift, so the beach can build up.	✓ ✗	Beach still accessible. No deposition further down coast = erodes faster.
Sea Walls	Concrete walls break up the energy of the wave . Has a lip to stop waves going over.	✓ ✓ ✗	Long life span Protects from flooding Curved shape encourages erosion of beach deposits.
Gabions or Rip Rap	Cages of rocks/boulders absorb the waves energy, protecting the cliff behind.	✓ ✓ ✗	Cheap Local material can be used to look less strange. Will need replacing.

Soft Engineering Defences

Beach Nourishment	Beaches built up with sand, so waves have to travel further before eroding cliffs.	✓ ✓ ✗ ✗	Cheap Beach for tourists. Storms = need replacing. Offshore dredging damages seabed.
Managed Retreat	Low value areas of the coast are left to flood & erode.	✓ ✓ ✗	Reduce flood risk Creates wildlife habitats. Compensation for land.

Project

Research a UK River. You need to include locational detail, geomorphic processes and how the river is managed at specific points to benefit people **You can do this digitally or on paper but you must submit this as a printed piece of work. Also include:**

Background
The features of the Upper, Middle and Lower courses of the river. History of flooding along the river and problems this has caused.

Management
What solutions are being used to help solve these problems? What solutions could they use? Is the cost of these solutions worth the benefit? Why?

Water Cycle Key Terms

Precipitation	Moisture falling from clouds as rain, snow or hail.
Interception	Vegetation prevent water reaching the ground.
Surface Runoff	Water flowing over surface of the land into rivers
Infiltration	Water absorbed into the soil from the ground.
Transpiration	Water lost through leaves of plants.

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.

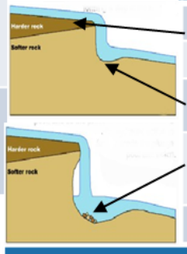
***Physical:* Relief**
Steep-sided valleys channels water to flow quickly into rivers causing greater discharge.

***Human:* Land Use**
Tarmac and concrete are impermeable. This prevents infiltration & causes surface runoff.

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.

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.

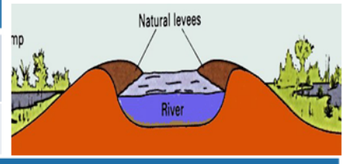
Lower Course of a River

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

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.



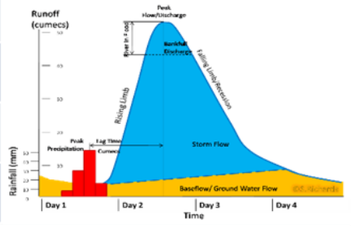
River Management Schemes

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.

Hydrographs and River Discharge

River discharge is the volume of water that flows in a river. Hydrographs who discharge at a certain point in a river changes over time in relation to rainfall

1. **Peak discharge** is the discharge in a period of time.
2. **Lag time** is the delay between peak rainfall and peak discharge.
3. **Rising limb** is the increase in river discharge.
4. **Falling limb** is the decrease in river discharge to normal level.

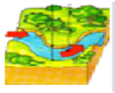


Middle Course of a River

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.

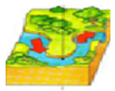
Formation of Ox-bow Lakes

Step 1



Erosion of outer bank forms river cliff. Deposition inner bank forms slip off slope.

Step 2

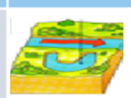


Further hydraulic action and abrasion of outer banks, neck gets smaller.

Step 3

Erosion breaks through neck, so river takes the fastest route, redirecting flow

Step 4

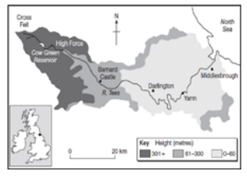


Evaporation and deposition cuts off main channel leaving an oxbow lake.

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. High Force 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.



Management
-Towns such as Yarm and Middleborough are economically and socially important due to houses and jobs that are located there.
-Dams and reservoirs in the upper course, controls river's flow during high & low rainfall.
- Better flood warning systems, more flood zoning and river dredging reduces flooding.

Geography Yr10 KO – Urban issue & Challenges

What is Urbanisation?

This is an increase in the amount of people living in urban areas such as towns or cities. In 2007, the UN announced that for the first time, more than 50 % of the world's population live in urban areas.

Where is Urbanisation happening?

Urbanisation is happening all over the word but in LICs and NEEs rates are much faster than HICs. This is mostly because of the rapid economic growth they are experiencing.

Causes of Urbanisation

Rural - urban migration (1) — **The movement of people from rural to urban areas.**

Push	Pull
• Natural disasters • War and Conflict • Mechanisation • Drought • Lack of employment	• More Jobs • Better education & healthcare • Increased quality of life. • Following family members.

Natural Increase (2) — **When the birth rate exceeds the death rate.**

Increase in birth rate (BR)	Lower death rate (DR)
• High percentage of population are child-bearing age which leads to high fertility rate. • Lack of contraception or education about family planning.	• Higher life expectancy due to better living conditions and diet. • Improved medical facilities helps lower infant mortality rate.

Project

Research a Megacity. It can be anywhere in the world, HIC/LIC/NEE. You must look at how it has grown to be this size and what growth is predicted for the future and **You can do this digitally or on paper but you must submit this as a printed piece of work. Also include:**

Problems
Detail problems that exist within the city. Make sure you include both short/long impacts, one specific to this city, ones common with megacities

Management
What solutions are being used to help solve these problems? What solutions could they use?

Sustainable Urban Living

Sustainable urban living means being able to live in cities in ways that do not pollute the environment and using resources in ways that ensure future generations also can use then.

Water Conservation

This is about reducing the amount of water used.
- Collecting rainwater for gardens and flushing toilets.
- Installing water meters and toilets that flush less water.
- Educating people on using less water.

Energy Conservation

Using less fossil fuels can reduce the rate of climate change.
- Promoting renewable energy sources.
- Making homes more energy efficient.
- Encouraging people to use energy.

Creating Green Space

Creating green spaces in urban areas can improve places for people who want to live there.
- Provide natural cooler areas for people to relax in.
- Encourages people to exercise.
- Reduces the risk of flooding from surface runoff.

Waste Recycling

More recycling means fewer resources are used. Less waste reduces the amount that eventually goes to landfill.
- Collection of household waste.
- More local recycling facilities.
- Greater awareness of the benefits in recycling.

AQA

Urban Issues & Challenges

Sustainable Urban Living Example: Freiburg

Background & Location	Sustainable Strategies
Freiburg is in west Germany. The city has a population of about 220,000. In 1970 it set the goal of focusing on social, economic and environmental sustainability.	• The city's waste water allows for rainwater to be retained. • The use of sustainable energy such as solar and wind is becoming more important. • 40% of the city is forested with many open spaces for recreation, clean air and reducing flood risk.

Traffic Management

Urban areas are busy places with many people travelling by different modes of transport. This has caused urban areas to experience different traffic congestion that can lead to various problems.

Environmental problems
- Traffic increases air pollution which releases greenhouse gases that is leading to climate change.

Economic problems
- Congestion can make people late for work and business deliveries take longer. This can cause companies to loose money.

Social Problems
- There is a greater risk of accidents and congestion is a cause of frustration. Traffic can also lead to health issues for pedestrians.

Congestion Solutions

- Widen roads to allow more traffic to flow easily.
- Build ring roads and bypasses to keep through traffic out of city centres.
- Introduce park and ride schemes to reduce car use.
- Encourage car-sharing schemes in work places.
- Have public transport, cycle lanes & cycle hire schemes.
- Having congestion charges discourages drivers from entering the busy city centres.

Traffic Management Example: Bristol

In 2012 Bristol was the most congested city in the UK. Now the city aims to develop it's integrated transport system to encourage more people to use the public transport. The city has also invested in cycle routes and hiring schemes.

Integrated Transport System

This is the linking of different forms of public and private transport within a city and the surrounding area.

Greenbelt Area

This is a zone of land surrounding a city where new building is strictly controlled to try to prevent cities growing too much and too fast.

Brownfield Site

Brownfield sites is an area of land or premises that has been previously used, but has subsequently become vacant, derelict or contaminated.

Urban Regeneration

The investment in the revival of old, urban areas by either improving what is there or clearing it away and rebuilding.