

Mark Scheme (Results)

Summer 2008

GCSE

GCSE Geography B (1313/3H)

Unit 1313 Paper 3H

Question Number	Answer	Mark
1(a)(i)	River sediment = C (1) River discharge = B (1)	(2)

Question Number	Answer	Mark
1(a)(ii)	Many reservoirs have been built on the Mississippi's tributaries	(1)

Question Number	Answer	Mark
1(a)(iii)	(Between Vicksburg and Baton Rouge) much of the discharge goes into a stream flowing off the Mississippi /a distributary / the Atchafalaya (1). (Between Vicksburg and Baton Rouge) the river splits in two (1) Accept an answer referring to the Atchafalaya as a "tributary" PROVIDED the candidate says some water is flowing INTO this stream from the Mississippi/main river	(1)

Question Number	Answer	Mark
1(b)	Pollution reduces fish numbers / kills fish (1) River carries nitrates/fertilisers/industrial waste <u>into the sea</u> (1) (Do not accept just waste, rubbish, sewage, sediment or chemicals) <u>Nitrates/fertilisers</u> cause algae to grow (1) Leads to formation of a dead/oxygen-depleted zone OR causes eutrophication (1)	(2)

Question Number	Answer	Mark
2(a)(i)	Meandering	(1)

Question Number	Answer	Mark
2(a)(ii)	South OR south-south-east OR south-east	(1)

Question Number	Answer	Mark
2(b)(i)	<u>Barrier</u> island (1) (Offshore) sand bank (1) Offshore bank (1) Reef (1)	(1)

Question Number	Answer	Mark												
2(b)(ii)	<table border="1"> <tr> <td>Algae</td> <td>S</td> </tr> <tr> <td>Erosion</td> <td></td> </tr> <tr> <td>Oilrigs</td> <td></td> </tr> <tr> <td>Oil spill</td> <td></td> </tr> <tr> <td>Sediment</td> <td>T</td> </tr> <tr> <td>Storm surge</td> <td></td> </tr> </table> <p>If more than two boxes are lettered, deduct 1 mark from the <u>total score</u> for each box in excess of two.</p>	Algae	S	Erosion		Oilrigs		Oil spill		Sediment	T	Storm surge		(2)
Algae	S													
Erosion														
Oilrigs														
Oil spill														
Sediment	T													
Storm surge														

Question Number	Answer	Mark
3(a)	<p>Straightening a river channel Shortening the channel/increasing its gradient (1) increases the speed of the river (1) so channel can <u>transport/move</u> larger discharge/amount of water (1)</p> <p>Dredging a river channel Removing sediment (1) increases the depth/width/size of the river bed (1) so channel can hold larger discharge /amount of water (1) OR reduces the resistance of the river bed (1) so it increases the speed of the river (1)</p>	(2)

Question Number	Answer	Mark
3(b)(i)	<p>(Replanting) forests/trees OR afforestation OR reforestation (1) (Creating) washland (1)</p> <p>Do not accept diverting water/sediment</p> <p>If 0 marks here, no marks possible in (b)(ii)</p>	(1)

Question Number	Answer	Mark
3(b)(ii)	<p>Replanting forests Trees intercept <u>rainfall</u> (1) and encourage infiltration (1) This reduces surface run-off (1) and regulates river flow (1) Trees take water from the soil/ground (through the roots) (1) Forests delay rainfall reaching the river channel OR increase the lag-time (1) Tree roots stabilise soil / reduce soil erosion (1) which prevents/reduces silting of river (1)</p> <p>Do not accept just trees absorb water (too vague) OR trees slow down/stop floodwater</p> <p>Creating washland Wetland is restored (1) Leveed river is reconnected with its floodplain (1)</p> <p>It serves as a flood storage area (1) OR absorbs some of the river's excess discharge (1) before more serious flooding occurs on farmland/elsewhere (1) Low value land is flooded(1) <u>therefore</u> high value land/settlement is less vulnerable to flooding (1)</p> <p>Do not accept just washlands absorb water (too vague)</p>	(2)

Question Number	Answer	Mark
4(a)	<p>They/plants absorb some energy of the hurricane (1) They/plants slow down/have a braking effect on winds/surge (1) by increasing friction (1) They/plants absorb some water from storm surge (1) OR reduce height of storm surge (1)</p> <p>Do not accept just they absorb water/rain OR they slow down <u>the hurricane</u> Do not accept effects of barrier islands as not coastal wetland</p>	(2)

Question Number	Answer	Mark
4(b)	<p>Jetties blocking long-shore drift LSD removes sand from land/beach/area (1) <u>downdrift</u> of a jetty (1) but jetty stops LSD from replenishing it (1) so the <u>protective</u> beach disappears (1) leaving land behind <u>exposed</u> to wave attack/marine erosion (1)</p> <p>Cutting canals Canals provide easy access for storm waves/surges (1) and expose more land to attack by the sea (1) Steep banks slump after canal construction (1) Wakes of ships also wear away banks (1) Widening canals further increases the hurricane highway effect (1)</p> <p>Saltwater moving inland Saltwater penetrates marshes (1) and kills plants (1) that grow (only) in freshwater (1) Roots of plants no longer bind soil together (1) Plant leaves no longer provide buffer against waves (1) Accept saltwater can chemically attack/dissolve land/rock (1)</p>	(3)

Question Number	Answer	Mark
5(a)	<p>Any height between 1 and 2 metres/m No mark if metres/m are omitted Do not accept "0 - 5 metres"</p>	(1)

Question Number	Answer	Mark
5(b)	<p>Much of the city is below sea level (1) OR <u>most</u> of the city is on a flood plain (1) The river/lake on its borders is higher than the city (1) OR the city lies in a "bowl" surrounded by water (1) Water will flow downhill into the city if a levee breaks (1) Rain must be pumped into the lake to prevent floods(1) <u>Geology/sediments</u> (of the site) makes it liable to subsidence (1) Canals expose the city to <u>storm surges</u> (1)</p> <p>Do not accept just "it is near a river/lake/sea"</p>	(2)

Question Number	Answer	Mark
6(a)(i)	<p>Large (1) circular (1) area of cloud /white area (1) Spiralling (1) in anticlockwise direction (1) Central gap/hole in cloud OR eye (1)</p> <p>Accept other valid descriptive points: e.g. estimate of its diameter e.g. 600 - 1000 km across estimate of its size in relation to say Florida, etc (Can gain one mark for this as well as one for "large")</p> <p>Do not accept comments on sea temperatures or features not visible in the photograph</p>	(3)

Question Number	Answer	Mark
6(a)(ii)	Category 3 OR 4	(1)

Question Number	Answer	Mark
6(b)	<p>Temperatures of the sea/Caribbean/Atlantic/Gulf of Mexico were high (1) OR the sea was warm/hot (1) Hurricanes gain their energy from the sea (1) Accept detail eg reference to latent heat transfer or evaporation (1) Temps above 27°C enough for a hurricane to form/start/persist (1) Temps in Gulf were even higher - 33+°C - so Katrina became very strong (1)</p>	(2)

Question Number	Answer	Mark
7	<p>Must point out changes in location (do not credit the starting point) and in a correct sequence:</p> <p>Eg (From Latitude 23° N) Katrina moved N/NW (1) It then veered W (1) and made a landfall in Florida (1) It then moved W (1) over the Gulf of Mexico (1) It moved N or along Longitude 89° W (1) and made a second landfall in Louisiana/USA (1). It passed through New Orleans (1) and continued N/inland (1).</p> <p>For top mark must include at least one precise location by name or latitude/longitude Do not accept ungeographical terminology (eg moved above Cuba instead of north of Cuba; moved down instead of south-west) OR vague comments (eg moved over the sea instead of moved over the Gulf of Mexico) Changes in hurricane strength are irrelevant to the question</p>	(4)

Question Number	Answer	Mark
8	Rain from Katrina was the main cause of flooding	
	Storm surges entered the city	X
	The Mississippi River overflowed its banks	
	Some levees gave way and increased the flooding	X
	85% of the city was under water	
	All the land that flooded was below sea level	
	The part of the city south of river was flooded worst	
	The Superdome shelter was in an unflooded area	
	Some canal floodwalls were not fit-for-purpose	X
	1 mark for each correct cross. If more than three statements crossed, deduct 1 mark from <u>total score</u> for each cross in excess of three.	(3)

Question Number	Answer	Mark
9(a)	<p>No marks for just mentioning/lifting health hazards from Figure 8. Candidates must explain why it is a hazard (e.g. by pointing out it can cause disease, injury or infection)</p> <p>One well-explained hazard (eg a <u>named</u> disease is linked to it) can score the two marks</p> <p>Water/ground was polluted/contaminated (max.1) Illness from water containing oil/sewage etc (1) eg typhoid/cholera/diarrhoea (1) Thirst from lack of drinking water (1) Illness/poisoning from chemical residues in ground (1) eg lead/mercury/arsenic (1) Disease from insects breeding in still water (1) eg malaria/mosquitoes (1) Injury/death from collapsed road bridge (1)</p> <p>Do not accept injuries from Superdome's damaged roof OR from ground subsidence due to pumping out floodwater</p>	(2)

Question Number	Answer	Mark
9(b)	<p>Many black people in New Orleans are poor (1) so they live in cheaper/poorer housing areas (1) which are in low-lying/flood-prone parts of the city (1) They cannot afford to live in the higher/drier parts of the city (1)</p> <p>Do not accept they could not afford to leave OR they did not have transport</p>	(2)

Question Number	Answer	Mark
10	<p>Credit valid reasons in support of their opinion Note that the US government (NOT local politicians) were responsible for some of the failings</p> <p>Reasons for No / Criticism was unfair They did issue an evacuation warning beforehand (1) An earlier warning would have been premature as the future path of Katrina was not then clear(1) Vast majority/80% of population did evacuate (1) It was not politicians' fault if people ignored the warning (1) They did provide an official shelter (Superdome) (1) The Superdome shelter was centrally located/easily accessible (1) and on higher/safer ground (1) Communication problems due to local TV/telephone blackouts would have hampered co-ordination (1) City's emergency procedures were overwhelmed by the totally unexpected scale of flooding (1) <u>Government/US Army Corps of Engineers/USACE</u> designed the levees/floodwalls which failed(1) <u>Government</u> were slow to give help (must develop e.g. send food or troops)(1) <u>Government/US Army Corps of Engineers/USACE</u> were slow to remove all the flood water (1) Credit knowledge from other sources: George Bush was on vacation and slow to react (1) The boss of he Federal Emergency Management Agency / FEMA was sacked for its slow response (1) Government had refused the funds requested by city politicians to upgrade the flood defences (1) OR government had cut funding for USACE (1)</p> <p>Reasons for Yes / Criticism was fair Evacuation warning came only one day before Katrina - too short notice (1) They had the technology to give an earlier warning (1) They should have foreseen that so many could not evacuate (1) because 28% were poor (1) and 27% had no car (1) Just one official shelter was not enough (1) Land around the Superdome shelter was flooded (1) Not enough food/water was stored in Superdome (1) Superdome did not have enough toilets (1) Electricity failure in Superdome was not prepared for (1) (Do not accept just 'air conditioning failed') Maybe fewer deaths if search-and-rescue continued after 31 Aug (1) Vulnerable elderly citizens were neglected (1) because disproportionate number of dead were over 59 (1)</p> <p>Credit knowledge from other sources: Levee maintenance had been neglected (1) Plans ignored the evacuation of elderly care homes (1) Communications faulty - 5% did not hear the warning (1) Co-ordination of the relief efforts was inefficient (1) eg school buses available but not used in evacuation (1)</p> <p>Candidates may argue the criticism was fair, unfair or a mixture of the two. Any four points for the marks.</p>	(4)

Question Number	Indicative content	
11(a)	<p>No mark for choice of option. Credit valid reasons for their choice.</p> <p>Criteria include: level and reliability of protection; health and safety (including building design and evacuation measures); types of engineering (hard v soft); impact on the environment of the delta (wetlands, barrier islands); effects on habitats/wildlife; effects on different groups in society; effects on trade, industry and employment; the attention given to future climate change (global warming, sea level rise, hurricane frequency); sustainability; cost and cost-effectiveness.</p> <p>Do not credit any references to Option A</p> <p style="text-align: right;">(12)</p>	
Level	Mark	Descriptor
	0	No rewardable material
Level 1	1-4	<p>Only considers a few relevant criteria. Makes simple points lifted from Figures 10 and 12.</p> <p>e.g. The levees in Option B will protect NO against Cat 4 hurricanes. New buildings will be hurricane-resistant in B. In C affordable housing will be built for service workers. The Superdome will house evacuees for a week. In Option C low-lying areas will be turned into parks. Dune grasses will be planted in the barrier islands Levees to withstand Cat 4 hurricanes will cost \$20 billion Option B/D will only protect against Cat 3 storms. C will only protect the city against Cat 4 hurricanes. It will take 25 years to build a new port in Option D. Option D does not mention flood emergency procedures</p> <p>To reach the top mark Makes several simple points</p>
Level 2	5-8	<p>Considers a number of relevant criteria. May use more sources than Figures 10 and 12. Makes a number of simple points, but also includes at least one developed (D) point (ie elaborates with more detail, or explanation, or makes comparisons).</p> <p>e.g. Option B will protect the city against the surges of 4 or 5 metres that you can get with a Cat 4 hurricane (D) Option B/D uses some soft engineering techniques that work with nature, not against it (D)</p>

	QWC	<p>Closing the Industrial Canal and MRGO will prevent a storm surge entering the city by these routes (D) Closing MRGO will reduce the intrusion of saltwater into freshwater marshes and so reduce erosion (D) Not rebuilding on the low lying land means any future floods will cause less damage to people and property (D) The planted marsh grass will trap more sediment and provide a stronger buffer against hurricanes (D) Sediment diversion will reduce subsidence of the delta, so it will protect the city better against storm surges (D) The total cost of Option C will be \$22 billion (D) Option C will cost nearly twice as much as B/D (D) Option D is the cheapest one (D) The new hurricane-resistant buildings in Option B will probably be too expensive for poorer evacuees (D) Revetments are a more expensive way of protecting the islands than adding sand and planting dune grasses (D) The levees in Option B/D will not protect the city against such strong hurricanes as the levees in Option C (D) Factories must relocate if the Industrial Canal closes (D) Halving the discharge in the Mississippi will mean ships have problems reaching New Orleans (D) With global warming, hurricanes may be stronger in future, so options B and D are less appropriate (D) The rising SL with GW will increase coastal erosion and flooding at high tide, especially during severe storms (D)</p> <p>To reach the top mark:</p> <ul style="list-style-type: none"> • Includes several developed (D) points • Writes in sentences with a clear, structured style. Spells, punctuates and uses grammar rules with some accuracy
Level 3	9-12	<p>Considers a range of criteria May explicitly prioritise between them. Includes many developed (D) points - see Level 2. Probably acknowledges some problems, as well as advantages, of the chosen option (and vice versa for the rejected ones)</p> <p>e.g. <u>Admittedly</u> Option C is the most expensive one, <u>but</u> it does give protection against stronger hurricanes (D) <u>Although</u> Option D is the cheapest one, it pays no attention to improving evacuation procedures or the design of new buildings (D) Option B/D does provide protection against Katrina-type hurricanes, <u>but</u> stronger storms than that may become more frequent (D)</p> <p>May make points not mentioned in Resource Booklet</p> <p>e.g. New Orleans is the USA's 5th largest port (D) Few boats use MRGO so closing it will not cause major commercial problems (D) Halving the Mississippi's discharge will cause problems for Baton Rouge; it depends on it for drinking water (D)</p>

	QWC	<p>The vastly increased discharge of the Atchafalaya may cause costly damage to existing bridges and settlements (e.g. Morgan City) in its valley (D)</p> <p>USACE use limited data to estimate flood frequencies so may underestimate the risks. Therefore their levee designs may still not be fit-for-purpose (D)</p> <p>Because of the soft earth, levees will sink in places and need repairing. If the new ones are not properly maintained they will not remain effective (D)</p> <p>May include some well-developed (WD) points</p> <p>e.g.</p> <p>By 2100 the city may be 2m below sea level due to 1m of land subsidence and a 1m sea level rise. Continuous upgrading of the levees and pump stations will be needed to keep pace. The ever-rising costs will be unsustainable (WD)</p> <p>Economic effects of reducing the Mississippi's discharge will be serious: trade will be disrupted if sea-going ships cannot reach Baton Rouge; factories may lack water for cooling; job losses will soar (WD)</p> <p>The new swamps by New Orleans will become wildlife sanctuaries, giving people extra leisure opportunities. The city could diversify and introduce ecotourism (WD)</p> <p>The present risk of Cat 5 hurricanes is 1:500, but they may become more frequent. Also a storm surge can start when a hurricane is still out at sea and stronger. So the risk of NO getting Cat 5 damage will be greater than 1:500 (WD)</p> <p>The Atchafalaya Valley is not sinking so a new town there may last 1000+ years. In contrast NO's sinking site is unsustainable. The Atchafalaya River may naturally capture the Mississippi's (and NO's) water anyway (WD)</p> <p>A faster flowing Atchafalaya will deepen its bed naturally, so it may not be necessary to improve the navigation for larger vessels by building revetments and wing dykes. This would reduce the cost of option D (WD)</p> <p>The Port of New Orleans handles 14% of the Mississippi River's traffic. The new port may not be finished in time to deal with all this important US foreign trade (WD)</p> <p>When the drainage canal floodgates are closed to protect NO from a storm surge, water could no longer be pumped into Lake Pontchartrain. This would increase the risk of flooding in the city from rainfall (WD)</p> <p>To reach the top mark:</p> <ul style="list-style-type: none"> • Makes some well-developed points in a thoroughly argued, balanced answer. • Writes in sentences that are clear, structured and coherent. Spells, punctuates and uses grammar rules with accuracy. Uses specialist terms appropriately.
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Question Number	Answer	Mark
11(b)	<p>General points</p> <p>How much time will be needed to complete the projects? (1) How much money will government be willing to allocate? (1) Will earlier design flaws in levees/floodwalls be corrected? (1) How reliable will engineers' estimates of flood risks be? (1) Will designs of new levees/floodwalls be fit-for-purpose? (1) What commercial importance do the IC and MRGO have? (1) What were the total costs of each scheme? (1)</p> <p>Specific points</p> <p>Option B What length of islands will the revetments protect? (1) How much marsh will spreading silt restore? (1) How often will dredged silt need to be spread? (1) Effect of this on costs and sustainability? (1) How much will clean-up, landfilling and rebuilding cost? (1) How much will the new housing cost to buy/rent? (1) Will poorer evacuees be able to afford it? (1) Will new housing be flood-proof as well as wind-proof? (1) How much will the improved evacuation plans cost? (1)</p> <p>Option C How much marsh will diverting sediment create? (1) How much will clean-up and rebuilding cost? (1) Will high-rise dwellings be in character? (1) How much will equipping of more refuge centres cost? (1)</p> <p>Option D How much marsh will diverting sediment create? (1) How many barrier islands will be restored? (1) How often will dredged material need to be spread? (1) Effect of this on costs and sustainability? (1) How will the reversion to swamps be achieved? (1) How much will that cost? (1) How much derelict land is available for redevelopment? (1) Precise location of the new port: eg distance upstream? (1) Details of new port's site: eg amount of "safe" dry land? (1) What protection will new port have against floods? (1) How much will building new port facilities cost? (1) How much will altering Old River Control Structures cost? (1) Effects of increased flow of the Atchafalaya on existing settlements (eg Morgan City) or road bridges? (1) Effects of reduced flow of Mississippi on shipping? (1)</p> <p>Accept any other valid points.</p>	(3)

Information for examiners

	Option B	Option C	Option D
New flood defences	<p>Cat 3 levees protect against 100yr floods</p> <p>Floodgates protect NO against storm surges from N and E BUT risk of flooding from rain when floodgates are shut</p>	<p>Cat 4 levees protect against 200yr floods</p> <p>Floodgates and IC dam protect NO against surges from N BUT risk of flooding from rain when floodgates are shut</p> <p>MRGO dam reduces saltwater intrusion and surges from E BUT one could still come via GIWW</p> <p>Parks act as buffer zones against hurricanes</p>	<p>Cat 3 levees protect against 100 yr floods</p> <p>Floodgates and IC dam protect NO against surges from N BUT risk of flooding from rain when floodgates are shut</p> <p>MRGO dam reduces saltwater intrusion and surges from E BUT one could still come via GIWW</p> <p>Swamps/parks act as buffer zones against hurricanes</p>
Plans for coastal wetlands and barrier islands	<p>Revetments protect islands from erosion and encourage dune and marsh growth</p> <p>Adding mud and grass reduces subsidence</p> <p>So better natural protection</p>	<p>Three water/sediment diversion gates mean nitrates trapped in marsh and reduced subsidence</p> <p>BUT no plans to restore islands</p> <p>So some enhanced natural protection against hurricanes</p>	<p>Six water/sediment diversion gates mean nitrates trapped in marsh and reduced subsidence</p> <p>Adding sand and grass helps restore barrier islands</p> <p>Much better natural protection</p>
Plans for damaged areas of the city	<p>Lowest areas raised (landfill)</p> <p>New neighbourhoods of mixed housing in all damaged areas</p>	<p>Lowest-lying areas now parks</p> <p>Housing plus shops, offices and factories in higher areas</p>	<p>Some low land reverts to swamp; parks in other damaged areas</p> <p>No residents in flood-prone areas</p>
Plans for a future flood emergency	<p>Clearer evacuation planning eg route signs, communications</p> <p>Wind-resistant buildings</p> <p>Much less land below SL so flood hazard reduced</p>	<p>More large shelters with better food and electricity supplies</p> <p>Flood-resistant high-rise dwellings</p> <p>Smaller city easier to evacuate</p>	<p>No plans, but lowest areas not populated - flood hazard reduced</p> <p>With its discharge halved less risk of Mississippi flooding NO</p> <p>Smaller city easier to evacuate</p>
Environmental Impact	<p>More habitats in wetlands and barrier islands - so greater protection for endangered species</p>	<p>More habitats in wetlands - so greater protection for endangered species</p> <p>Fewer nitrates washed into Gulf so less eutrophication</p>	<p>More habitats in wetlands and islands - so greater protection for endangered species</p> <p>Far fewer nitrates washed into Gulf so less eutrophication</p>
Impact on navigation	<p>Mississippi River traffic not disturbed</p> <p>New defences won't impair navigation on MRGO and GIWW</p>	<p>Mississippi River traffic not disturbed</p> <p>MRGO closed and no direct access to Lake Pontchartrain for ships on Industrial Canal (BUT few ships use these canals anyway)</p>	<p>MRGO closed (BUT few ships use it anyway)</p> <p>Lower river flow so hard for ships to reach NO & BR BUT barges can access new port on Atchafalaya</p> <p>Wing dykes and revetments will improve Atchafalaya navigation</p> <p>But bigger discharge deepens the channel for ships - may reduce need for artificial improvements</p>

	Option B	Option C	Option D
Economic Impact	Hard to attract businesses and workers back with only Cat 3 protection	New businesses encouraged by enhanced flood defences Labour force will grow rapidly with new housing available Factories along IC may close Less sea pollution - so revival of fishing?	New hi tech offices (but maybe not with only Cat 3 protection) Ecotourism may boom with new swamps ie diversification in NO Less river trade/water supply - so industrial decline in NO (& BR) BUT jobs available in new port Less pollution - revival of fishing?
Social Impact	Mixed housing areas encourage greater ethnic integration Hurricane-resistant houses may be too costly for poorer people	Affordable housing encourages poor people to return Ethnic Integration may be limited without mixed housing areas	More hi tech firms and less heavy industry - fewer low skilled jobs % of black people will fall as more lived in the flooded areas Reduced river flow may threaten NO & Baton Rouge water supplies
Time needed to implement	Quite short to upgrade to Cat 3 Landfill will take time to settle before rebuilding can start	Long time to upgrade to Cat 4 Increase in SL & hurricanes may overtake the upgrading work	Quite short to upgrade to Cat 3 25 yrs to build port - may not mesh with decline of NO industry
Effects of future climate change	Cat 3 levees - least safeguard v SL rise and stronger hurricanes 20% increase in Mississippi flow greatly increases flood hazard	Cat 4 levees - fair safeguard v SL rise and stronger hurricanes 20% increase in Mississippi flow increases flood hazard	Cat 3 levees - least safeguard v SL rise and stronger hurricanes 20% increase in Mississippi flow offsets the 50% planned cut - so losses from latter may be lower
Long term sustainability	Very doubtful - NO will still subside and SL will rise too Much bigger future flood risk, esp. if USACE under-estimate hurricane frequencies Spreading of mud in delta may need constant repetition	Doubtful - NO will still subside and SL will rise too Bigger future flood risk if levees are not raised even higher Atchafalaya may still capture Mississippi's water - sudden big negative impact on NO	Reasonable - retreat of city to higher land will be beneficial. Future coastal flood risk greater but river flood risk lower New port is sustainable - dry site on higher, growing part of delta Spreading of sand in islands may need constant repetition
Costs and cost - effectiveness	\$11.5 billions Govt more likely to fund it Cat 3 levees are cheapest but may not be cost-effective here given future climate change Costs far less than \$75 billions of damage done by Katrina BUT other costs: eg clean-up, landfilling, rebuild, evacuation plans, repeat spreading of mud	\$21 billions Govt not likely to fund it Cat 4 levees are dearer but may be more cost-effective given future climate change Still costs less than \$75 billions of damage done by Katrina BUT some other costs: eg clean-up, rebuild, equipping of more shelters	\$11.1 billions Govt unlikely to agree to it Cat 3 levees are cheapest but may be cost-effective here as lowest areas not built on Costs far less than \$75billions of damage done by Katrina BUT many other costs: eg clean-up, rebuild, repeat spreading of sand, new ORCS, new port