IMCORE Severn Estuary Adaptation Scenarios: *Planning response to climate change in the Severn Estuary in 2040*

A. Introduction

Some 34 delegate stakeholders drawn from the gamut of professional specialisms relating to coastal management (especially spatial planning) participated in a scenario building exercise with the aim of informing a more adaptable and sustainable planning response for the Severn Estuary in the context of coastal climate change (by 2040), in the autumn of 2010. The process addressed a Critical Question defined as: "What drivers will affect planning response to climate change in the Severn Estuary in 2040?" Stage 1 of the Exercise collected and clustered drivers of change in the Estuary using the PESTLE framework. Stage 2 scored the Uncertainty and Significance/Impact of these driver clusters, was also carried out in full (see section C. below).

To realise Stage 3 delegates selected the driver clusters that were most independent of each other, so that the most important clusters – the ones seen as most pertinent to the topic – would be used as the axes to develop the 2 x 2 scenario matrix.

These were:

- **ECONOMIC – the availability of resources in a post oil economy, and their impact on the estuary**

This included drivers related to:

  - Value of ecosystem services, biodiversity banking
  - Global economic growth flat/volatile
  - Post peak will have implications for sectors in this area

- **SOCIAL - adaptive capacity**

This included drivers related to:

  - Social acceptance of difficult long term choices versus political timescales
  - Community fragmentation might result
  - Social implications and needs - housing, culture, relocation

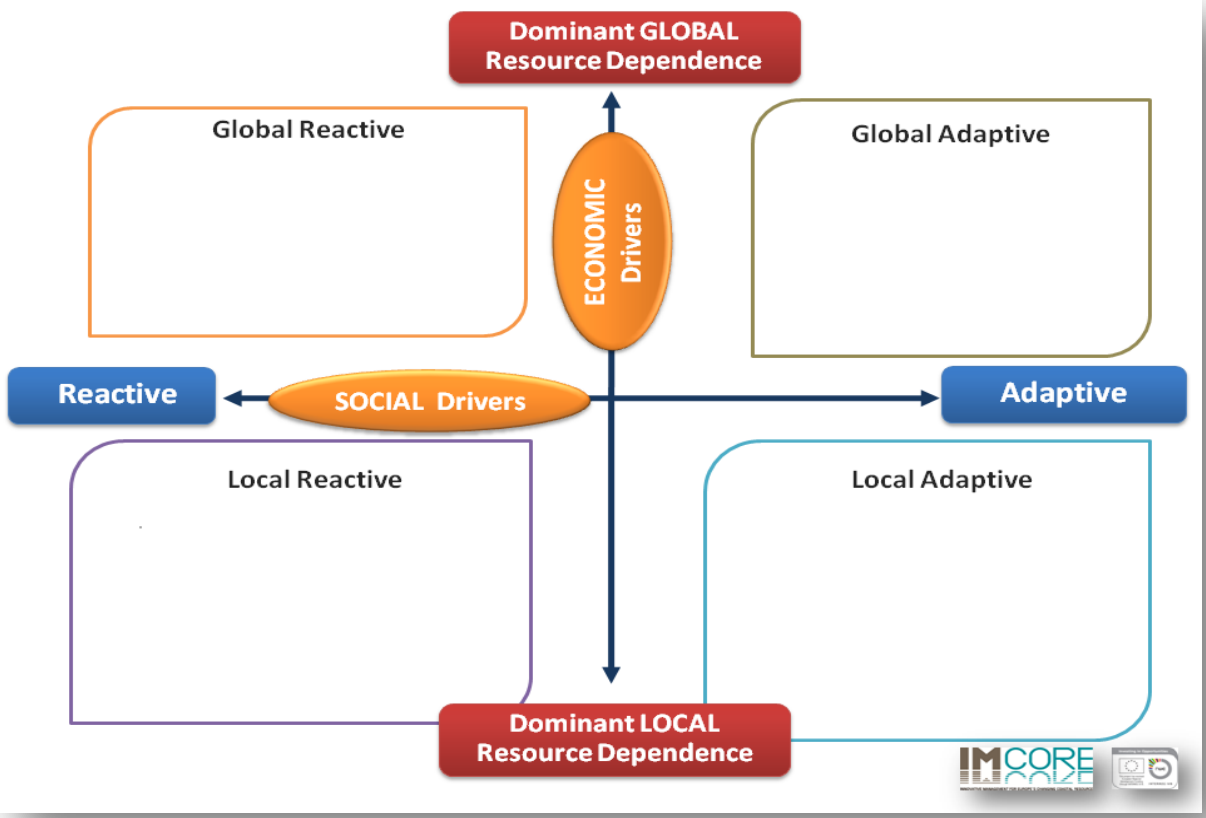

Figure 1: Severn Estuary 2040 2x2 Scenario Matrix

Stage 4 of the scenario building process - refining driver logic in a 2X2 matrix and developing scenario narratives – yielded the following draft scenarios (see B. for full narrative):

Scenario 1 - Global Adaptive

Riding the Dragon

An optimised progressive version of the present. A globally-connected region where policies focus on technological and market-oriented institutional reforms and measures to supply solutions to climate change adaptation.

Scenario 2 - Global Reactive

More is Less

A continuation of the worst of the present - expectations of failing market- led economy growth to yield sufficient economic growth to resource adaptation and effective coastal management (where funded).

Scenario 3 - Local Adaptive

Strong Local Roots

This is the new economic paradigm future - *Prosperity without Growth* – of Transition Towns, Energy Descent Adaptation Plans and Steady State Economics. Regional social and economic units and systems are the focus of political activity, and there is a broad spectrum strengthening of local institutions.

Scenario 4 - Local Reactive

Little Britain

This is prima facie the least attractive possible future. A resource starved, regionalized and fragmented set of regions, preoccupied with their own climate change security and adaptation. Emphasis on regional markets, and not focussed on common goods, uncooperative with regard to the higher national and global systems.

B. Four Draft Scenarios

Scenario 1 - Global Adaptive

Riding the Dragon

An optimised progressive version of the present. A globally-connected region where policies focus on technological and market-oriented institutional reforms and measures to supply solutions to climate change adaptation.

Characteristics

- Enlightened regulation at all levels from EU through national to regional.
- Funding generated from growth is distributed centrally for adaptation planning in regions.
- Resources available for responses to wildcard climatic change events on the Katrina scale,
- Local political representation will be less significant than national or EU.
- Spatial planning legislation pertaining to coastal adaptation developed lineally and consistently from statutes and regulatory regimes established in the earlier part of the century.
- Tensions emerge between local and higher levels actors and stakeholders.
- Government predominantly a DAD (Decide-Announce-Defend)
- Massive emphasis on adaptation measures, especially with regard to physical infrastructure and housing.
- Varying levels of growth, often dependant on infrastructure capacity.
- Globalisation impacts broadly improve and continue, especially with regard to the development of proprietary climate change science and UK competitive advantage in some other niche sectors.
- Highly skilled and mobile workforce provides a significant tax base in more urbanized areas and favoured coastal suburban zones.
- Insurance subsector develops sophisticated new offerings covering the complexities of regional defence and new types of built environment reconditioning and climate change proofing.
- Energy generation and supply predominantly nuclear and renewable and more costly for the consumer.

- New public infrastructure is largely funded by CIL or its successor (Community Infrastructure Levy) and contracted to private partnerships

- Coastal squeeze continues, with the successful technocratic rich especially drawn to highly defended and designed dwellings on coastal plains.

- Communities accept adaptation costs as necessary social burdens, but social solidarity and cohesion in some areas weaken drastically.

- Social trauma due to climate change events mitigated by a national compensatory system.

- International climate change induced immigration into the zone negligible

- Technologies and innovations diffuse increasingly rapidly, especially with regard to defence systems and building design. Techno-fix posture, reliance on global geotechnical solutions, is mainstream and consumes much economic and social investment.

- Legal regime heavily regulatory and prescriptive in planning terms

- Much adaptation at micro level (e.g. building retro-fitting) legally compulsory and punitive measures will be imposed for non-participation.

- Jurisdictional differences between England and Wales hindering unified effective adaptation planning response have been removed.

- Natural systems continue to degrade in the Estuary but at a slower pace due to the continuance and development of EU regulations regarding habitats.

Narrative

Political

Public opinion is heavily influenced by the international consensus. Enlightened regulation at all levels from EU through national to regional introduces progressive norms and innovations that are rigorously applied and updated. The EU in particular given the scale of its investment in research and scientific innovation for adaptation is hugely influential and acts on a supra regional adaptive systems level. Localised responses to this international regulatory conformism are varied, depending on the perceived goods delivered. The regional devolved government in Wales acts increasingly in the role of active agent of EU and UK higher policy implementation - this is also apparent in S-W England, where local partnerships and participatory processes function similarly. Notwithstanding political rhetoric, the additional money for funding generated from growth is distributed centrally for adaptation planning in the regions. Sufficient resources will be available for extravagant and swift politically motivated responses to wildcard climatic change events on the Katrina scale, especially if they impact large coastal conurbations. Local political representation will be less significant than national or EU. The EU will impose a consensus on emissions scenarios deriving from applied research and its own agencies. Spatial planning legislation pertaining to coastal adaptation will have developed lineally and consistently from statutes and regulatory regimes established in the earlier part of the century. Given the centralization tendencies of government for the sake of adaptation some tensions will emerge between local and higher levels actors and stakeholders. Although regional stakeholder hierarchies will feel and be less influential than global and national actors in instituting policy and adaptation measures impacting locally – they will accept this largely as a quid pro quo for greater investment at local level for resilience to change. Government will be very

predominantly a DAD (Decide-Announce-Defend) approach, sometimes also DADA (Decide-Announce-Defend-Abandon). These trends will be augmented by changes in the machinery of democracy, with continued reorganisations of units of local government into larger geographical unitary bodies. Government will have shifted to give massive emphasis to adaptation measures, especially with regard to physical infrastructure and housing. Food security issues will be increasingly a concern, with declining productivity and imports being successfully countered by GI crop development and new intensive and where possible sustainable farming practices.

Economic

Those parts of the region linked to global trade networks and supply chains display varying levels of growth, often dependant on infrastructure capacity. Globalisation impacts manifest earlier in the century – indicative of the UK's short-term comparative decline in world markets – will broadly correct and continue, especially with regard to the development of proprietary climate change science and UK competitive advantage in some other niche sectors. Improved training and education has created a highly skilled and mobile workforce which provides a significant tax base in more urbanized areas and favoured coastal suburban zones. The insurance subsector will develop sophisticated new offerings covering the complexities of regional defence and new types of built environment reconditioning and climate change proofing, both domestic and private sector. Energy generation and supply will be predominantly nuclear and renewable and more costly for the consumer. Greater UK national government intervention in economic policy making in a failing devolved Wales will have corrected many inequalities of GVA vis à vis adjacent part of England but Wales will still lag behind in terms of competitiveness. New public infrastructure is largely funded by CIL or its successor (Community Infrastructure Levy) and contracted to private partnerships to deliver – a more solid tax base in most areas reduces the need for continued trans-regional resource allocation. Parallel initiatives to develop a New Economic Paradigm based on non-market based notions of wealth creation etc significant earlier in the century and tied to the sustainability/migration agenda persist but have little influence on many areas of policy making and real economic activity due to the resurgence of the older economic model in the 2020s and the successful massive introduction of renewable/nuclear energy sources and generation coincident with the decline in global oil production.

Social

Coastal squeeze continues, with the successful technocratic rich especially drawn to highly defended and designed dwellings on coastal plains – so-called Adaptation Estates. This will be matched by growth in intensive leisure use and national tourism by the less affluent majority unable to afford air travel and long-haul sea transport. Higher levels of lifelong education and exposure to adaptation science and planning will make society more responsive and resilient to climate change impacts. Communities will accept adaptation costs as necessary social burdens, although given increasing inequalities of wealth, social solidarity and cohesion in some areas may weaken drastically. Older citizens will remain economically active for a lot longer and well (the Generation Xers don't like retiring), and will continue to favour better defended coastal residential areas despite higher climate change overheads. Social trauma due to climate change events will be mitigated by the national compensatory system. This will occur in a managed fashion and will be regulated by the central government based on acknowledged ethics of social justice. New technologically intensive amenities and social facilities will be developed to compensate those alienated by loss of traditional community structures and lifestyle activities. Training and education will imbue the populace with alternative more sustainable notions of quality of life and well-being (the management of social expectations), which in turn will cause more general attitudinal shifts and the development of more organic social forms and conventions. In this time frame international climate changed induced

immigration into the zone will be negligible, but pre-existing patterns of national intra-regional migration of the affluent and skilled from larger metropolitan areas to better serviced rural areas on the estuary zone will continue. Economic immigration of younger workers from the developing world will continue as demographic declines in fertility persist.

Technological

Technologies and innovations will diffuse increasingly rapidly in this society, and those relating to adaptation will be distributed and adopted with similar rapidity, especially with regard to defence systems and building design. The techno-fix posture, reliance on global geotechnical solutions, is mainstream and consumes much economic and social investment. Where this localized sensitively it is highly successful – when it fails however the consequences are typically catastrophic. Planners are usually nowadays trained scientists or have prior qualifications in relevant natural and physical sciences. Advances in communications technologies and computer modelling do provide much insulation from sudden catastrophic events, and supply sophisticated emergency responses as well. The hi-tech dependent ethos of this scenario is also manifest in more efficient energy distribution, solutions for surface water management and transport etc. Technology also permits more participation in planning by the broader community which is more than tokenistic and provides a local evidence base used credibly by central planners.

Legal

The legal regime is heavily regulatory and prescriptive in planning terms, with incidental derogation when required in the event of emergency. Planners are adept at reconciling compliance to EU and national habitat and conservation regulations and the introduction of new energy generation and defences systems utilising technologies whose ecological impacts are not known. Much adaptation at micro level (e.g. building retro-fitting) will be made legally compulsory and punitive measures will be imposed for non-participation. Jurisdictional differences between England and Wales hindering unified effective adaptation planning response have been removed subsequent to catastrophic flooding events in the early 2020s and a Seven Estuary and Associated River Basins Adaptation Planning Commission (SEARBAPC) with executive powers formed. Newer versions of shoreline management plans (SMP3, SMP4 etc) will be made in to statutes and their recommendations will have the force of law.

Environmental

Natural systems continue to degrade in the Estuary but at a slower pace due to the continuance and development of EU regulations regarding habitats. Conservation at all costs will be permitted in some restricted sub-zones and habitats, with compensatory habitat creation also enforced elsewhere. Resource issues conflicts will largely be decided where possible in favour of continued development and expansion in habitation and human economic activity. Archaeological and built heritage sites will be defended on a very selective basis dependent on their perceived long term leisure potential. Serious attempts are made to combat species change and provide habitat relocation in a systematic fashion, introducing bio-controls and refugia where possible, but the sheer quantity of change is often too much for the advanced technological solutions attempted. Water cycle management is however improved due to the technological and global ethos of this future – especially in the light of increased run-off of sewage and toxic substances due to increased precipitation and flooding. New forms of harvesting the environment especially in the context of food security emerge which may add to pre-existing environmental degradation.

Scenario 2 - Global Reactive

More is Less

A continuation of the worst of the present - expectations of failing market- led economy growth to yield sufficient economic growth to resource adaptation and effective coastal management (where funded).

Characteristics

- Regulation at all levels selectively and unevenly applied and updated due to resource constraints.
- Some resources available for politically motivated responses to wildcard climatic change events.
- Spatial planning legislation pertaining to coastal adaptation has diverged episodically from statutes and regulatory regimes established in the earlier part of the century at crisis points eventuated by several cyclical economic depressions and attendant social unrest.
- Regional stakeholder hierarchies less influential than global and national actors in instituting policy and adaptation measures impacting.
- Government predominantly a DAD (Decide-Announce-Defend) approach.
- Food security issues increasingly a concern, with declining productivity and imports.
- Low levels of growth, largely due to infrastructure limitations.
- Deleterious impacts of globalisation impacts manifest earlier in the century (sudden disinvestment, short-termist capital investment in the region etc) continue and intensify
- Training and education have not delivered the uniform highly skilled Knowledge Economy workforce yielding a sufficient tax base to fund adequate adaptation measures.
- Insurance subsector has failed to develop instruments covering the complexities of regional defence and new types of built environment reconditioning and climate change proofing.
- Energy generation and supply a mix of reconditioned coal and gas burning with the new nuclear stations only now coming online, and renewables limited to cheaper older technologies.
- New public infrastructure largely funded by CIL or its successor (Community Infrastructure Levy) and contracted to private partnerships to deliver – a lower tax base in some areas may necessitate continued trans-regional resource allocation.
- Society more reactive and less resilient to climate change impacts when they occur.
- Communities are divided and are less willing to accept adaptation costs as necessary social burdens - increasing inequalities of wealth, social solidarity and cohesion.
- Technologically intensive amenities and social facilities expensive and inaccessible.
- International climate changed induced immigration into the zone significant due to the reactivity of climate change responses elsewhere in Europe and North Africa.
- Technologies and innovations diffuse at an uneven pace and with uneven adoption
- Dis-coordinated patterns of energy distribution, simplistic and fragmented solutions for surface water management and transport etc.
- Participation in planning by the broader community is highly restricted and tokenistic due to the concentration of authority within the traditional planning function.
- Legal regime heavily regulatory and prescriptive in planning terms.

- Jurisdictional differences between England and Wales hindering unified effective adaptation planning response have been removed piecemeal, but still haven't been streamlined to deliver meta-regional and unified coordination.
- Natural systems will continue to degrade - conservation at all costs will be permitted in very restricted sub-zones and habitats.

Narrative

Political

Public opinion is often reactive regarding the international consensus on the need for adaptation planning. Regulation at all levels from EU through national to regional introduces progressive norms and innovations that are however selectively and unevenly applied and updated due to resource constraints. The EU has reduced the scale of its investment in research and scientific innovation for adaptation, but still provides the main influence and models for action on a supra regional adaptive systems level. Localised responses to international regulatory conformism are varied, depending on the perceived return on limited strategic investment. The regional devolved government in Wales acts increasingly in large part as a passive agent of EU and UK higher policy implementation - this is also apparent in S-W England, although vestiges of local partnerships and participatory processes are retained. Despite political rhetoric, less local funding availability means more centralisation of adaptation planning. Some resources will be available however for extravagant and swift politically motivated responses to wildcard climatic change events on the Katrina scale, especially if they impact large coastal conurbations. Local political representation will be less significant than national. The EU will impose a consensus on emissions scenarios deriving from applied research and its own agencies. Spatial planning legislation pertaining to coastal adaptation will have diverged episodically from statutes and regulatory regimes established in the earlier part of the century at crisis points eventuated by several cyclical economic depressions and attendant social unrest. Given the centralization tendencies of government for the sake of adaptation significant tensions will emerge between local and higher levels actors and stakeholders. Regional stakeholder hierarchies will feel and be less influential than global and national actors in instituting policy and adaptation measures impacting locally – resulting in perceptions at local level of less resilience to change. Government will be very predominantly a DAD (Decide-Announce-Defend) approach, sometimes also DADA (Decide-Announce-Defend-Abandon). These trends will be augmented by changes in the machinery of democracy, with continued reorganisations of units of local government into larger geographical unitary bodies. Government will have shifted to give massive emphasis to adaptation measures, especially with regard to physical infrastructure and housing. Food security issues will be increasingly a concern, with declining productivity and imports being only partially countered by re-legitimized GI crop development and new intensive (but environmentally degrading) farming practices.

Economic

Many parts of the region are linked to global trade networks and supply chains, but display low levels of growth, largely due to infrastructure limitation. Deleterious impacts of globalisation impacts manifest earlier in the century (sudden disinvestment, short-termist capital investment in the region etc) – indicative of the UK's comparative decline in world markets – continue and intensify although development of proprietary climate change science will display competitive advantage in some niche

fields. Training and education have not delivered the uniform highly skilled Knowledge Economy workforce yielding a sufficient tax base to fund adequate adaptation measures, except in select pockets (more urbanized areas and favoured coastal suburban zones). The insurance subsector has failed to develop instruments covering the complexities of regional defence and new types of built environment reconditioning and climate change proofing in vulnerable areas, the slack being taken up by UK government emergency insurance bond schemes which have limited funding for compensation. Energy generation and supply is still a mix of reconditioned coal and gas burning with the new nuclear stations only now coming online, and renewables limited to older technologies that are less costly for the consumer. Greater UK national government intervention in economic policy making in a failing devolved Wales has had a patchy impact on the many inequalities of GVA vis à vis adjacent parts of England and Wales still lags behind in terms of competitiveness. New public infrastructure is largely funded by CIL or its successor (Community Infrastructure Levy) and contracted to private partnerships to deliver – a lower tax base in some areas may necessitate continued trans-regional resource allocation. Parallel initiatives to develop a New Economic Paradigm based on non-market based notions of wealth creation etc significant earlier in the century and tied to the sustainability/migration agenda persist but have little influence. They have little influence on many areas of policy making and "real" economic activity however despite evident failings of the older economic model emerging since the 2020s and the failure to deliver sufficient low-cost renewable/nuclear energy sources and generation coincident with the decline in global oil production.

Social

Coastal squeeze continues, although many coastal populations are impoverished and face the flight of more affluent individuals to better defended and designed dwellings inland – so-called Elevation Estates. This will be matched by growth in intensive leisure use and national tourism by the less affluent majority unable to afford air travel and long-haul sea transport. Uneven levels of lifelong education, sceptical media commentary and scant exposure to adaptation science and planning will make society more reactive and less resilient to climate change impacts when they occur. Communities are divided and are less willing to accept adaptation costs as necessary social burdens - increasing inequalities of wealth, social solidarity and cohesion in some areas significantly weaken. Demographic ageing and the general impoverishment of the Generation X retired, coupled with a smaller economically active population will drive most older citizens away from costly coastal settlements into denser hinterland conurbations with cheaper land and services and lower climate change overheads. Social trauma due to climate change events will have similar impacts. This will occur in a piecemeal reactive fashion however and will be weakly regulated by the central government paying lip service to the ethics of social justice. New technologically intensive amenities and social facilities will be expensive and inaccessible to many alienated by the loss of traditional community structures and lifestyle activities. Training and education have failed to supply the populace with alternative more sustainable notions of quality of life and well-being (the management of social expectations) despite 30 years of (diminishing) public investment. Attitudes remain rooted in traditional patterns and consequently the development of more organic social forms and conventions required for adaptation has been weak. In this time frame international climate changed induced immigration into the zone may be significant due to the reactivity of climate change responses elsewhere in Europe and North Africa. Pre-existing patterns of national

intra-regional migration of the displaced from more impact affected parts of the UK e.g. East Anglia to less damaged settlements in the estuary zone will grow. Economic immigration of younger workers from the developing world will intensify as demographic ageing ramps up.

Technological

Technologies and innovations will diffuse at an uneven pace and with uneven adoption in this society, including those relating to adaptation, coastal defence systems and building design. A general reliance on global geotechnical solutions persists, but lacks systematic economic and social investment. Where available they are localized and ad hoc, on the basis of urgent need – and when unavailable consequences are typically catastrophic. Planners remain poorly trained in scientific disciplines relevant to adaptation and rarely hold prior qualifications in relevant natural and physical sciences. Communications technologies and computer modelling are not reliable, accessible or certain enough to supply sufficient warning of sudden catastrophic events, and emergency responses as a result are reactive and uncoordinated. The reactionary ethos of this scenario is also manifest in disco-ordinated patterns of energy distribution, simplistic and fragmented solutions for surface water management and transport etc. Participation in planning by the broader community is highly restricted and tokenistic due to the concentration of authority within the traditional planning function – the only trusted source of authority in the face of cumulative and successive shocks to the system.

Legal

The legal regime is heavily regulatory and prescriptive in planning terms, with frequent derogation when required in the event of emergency. Planners are still plagued by continued conflicts between strict compliance to EU and national habitat and conservation regulations and the urgency of installing new energy generation and defences systems whose ecological impacts are not known. Much adaptation at micro level (e.g. building retro-fitting) will be made legally compulsory and punitive measures will be imposed for non-participation. Jurisdictional differences between England and Wales hindering unified effective adaptation planning response have been removed piecemeal, but still haven't been streamlined to deliver the fully meta-regional and unified coordination that a shambolic response to catastrophic flooding events in the early 2020s made the public expect (due to cost apparently). Newer versions of shoreline management plans (SMP3, SMP4 etc) have emerged but their recommendations lack the force of law and are dead-lettered wherever local authorities/regional authorities lack adequate human and capital resource to implement them fully.

Environmental

Natural systems will continue to degrade in the Estuary despite the continuance and development of EU regulations regarding habitats. Conservation at all costs will be permitted in very restricted sub-zones and habitats. Resource issues conflicts will largely be decided where possible in favour of continued development and expansion in habitation and human economic activity. Archaeological and built heritage sites will be defended on a very selective basis dependent on their perceived significance – most will be abandoned expediently when the need arises. Some attempts are made to combat species change and provide habitat relocation in a systematic but underfunded fashion – the more egregious invaders will be combated in a highly public fashion, others operating more subtly longer –term on ecological sub-systems will be accepted as inevitable damage. Water cycle

management will be largely unchanged – deploying conventional solutions to respond to increased run-off of sewage and toxic substances due to increased precipitation and flooding. New and often unsustainable forms of harvesting the environment especially response to food security dislocations – will emerge often adding to existing environmental degradation.

Scenario 3 - Local Adaptive

Strong Local Roots

This is the new economic paradigm future - *Prosperity without Growth* – of Transition Towns, Energy Descent Adaptation Plans and Steady State Economics. Regional social and economic units and systems are the focus of political activity, and there is a broad spectrum strengthening of local institutions.

Characteristics

- Localised adaptive responses varied, depending on the perceived goods delivered, and frequently reference is made to exemplars/models of similar localised proactive planning in other parts of the UK and Ireland.
- Regional devolved governments act increasingly independently of EU and UK higher policy implementation
- Resources available for systematic low-tech and gradual long-term multiple-stakeholder motivated responses to wildcard climatic change
- Local political representation more significant than national or EU.
- Spatial planning legislation pertaining to coastal adaptation developed lineally and consistently from statutes and regulatory regimes established in the earlier part of the century by the regional assemblies.
- Regional stakeholder hierarchies more influential than global and national actors in instituting policy and adaptation measures impacting locally
- Government predominantly an EDD (Engage-Discuss-Decide) bottom-up approach.
- Emphasis on adjusting settlement patterns and infrastructure re-routing as well as sustainable affordable construction and retrofitting for climate change proofing.
- Food security issues met by radical changes in consumer behaviour, widespread small scale mosaics of food producers and reintroduction of arable farming and sustainable wetland farming methods.
- Lower levels of resource use (especially energy), localisation of production-consumption and shorter supply chains.
- Renewal of regional economic endogenous sustainable activity, driven by readjustments in consumer expectation (*Prosperity without Growth*) - a steady-state economy
- Shift to indigenous small scale renewable energy generation (phased over 20 years) a
- Local Community Compact Assurance Unions replace bankrupt insurance subsector in partnership with local democratic institutions.
- Local public infrastructure funded by RegCIL or its successor (Regional Community Infrastructure Levy) and contracted to community-private partnerships to deliver.
- Coastal squeeze lessens, with residential housing development being focused exclusively more easily defended, less tech-intensive dwellings situated on agriculturally marginal land

- Higher levels of lifelong education and exposure to adaptation science and planning make society more cohesive and resilient to climate change impacts.
- General attitudinal shifts and the development of more organic social forms and conventions.
- International climate change induced immigration still occurs but rigidly quotaized and regulated on the basis of a cyclically reviewed *Regional Carrying Capacity Plan* (RCCP).
- Technologies and innovations still diffuse rapidly in this society due to the efficiency of digital communication technologies.
- Self-reliant & self-generated posture, i.e. reliance on locally suitable low-tech solutions, is mainstream and consumes less economic and social investment.
- The legal regime is heavily regulatory and prescriptive in planning terms, with incidental derogation when required in the event of emergency as determined by community stakeholders.
- Adaptation at micro level (e.g. building retro-fitting) legally compulsory where affordable.
- Jurisdictional differences between England and Wales have deepened but unified effective adaptation planning response for the Estuary developed and implemented pragmatically
- Natural systems degrade less in the Estuary due to lower levels of coastal economic and social activity as well as the continuance and development of EU regulations regarding habitats.

Narrative

Political

Public opinion is supportive of the national-regional consensus on developing bespoke Estuary specific adaptation planning. Innovative regulation at regional and local level introduces progressive norms and innovations that are rigorously applied and updated. UKCIP, EU and IPCC higher level climate change research is a standard referent for basic scientific proofs of future change but the onus is on collecting consistent local datasets and developing regional level adaptive systems. Localised adaptive responses to adaptation are varied, depending on the perceived goods delivered, and frequently reference is made to exemplars/models of similar localised proactive planning in other parts of the UK and Ireland. The regional devolved government in Wales acts increasingly independently of EU and UK higher policy implementation - this is also apparent in S-W England, where local partnerships and participatory processes function prominently under the umbrella of the West Country Regional Assembly. With minimal political rhetoric, the additional money for funding generated from endogenous growth is distributed evenly within the region for adaptation planning. Sufficient resources will be available for systematic low-tech and gradual long-term multiple-stakeholder motivated responses to wildcard climatic change events on the Katrina scale, whatever the type or scale of communities affected. Local political representation will be more significant than national or EU. Spatial planning legislation pertaining to coastal adaptation will have developed lineally and consistently from statutes and regulatory regimes established in the earlier part of the century by the regional assemblies. Given the decentralization tendencies of regional government for the sake of adaptation, some tensions will emerge between the local and higher levels actors and stakeholders, who will contest the vestigial role allowed central planners. Regional stakeholder hierarchies will feel and be more influential than global and national actors in instituting

policy and adaptation measures impacting locally – this will be legitimised largely as a quid pro quo for greater investment from the only sources of funding available (i.e. deriving from the local economic base) to engineer resilience to change. Government will be very predominantly an EDD (Engage-Discuss-Decide) bottom-up approach. These trends will be augmented by changes in the machinery of democracy, with continued reorganisations of units of local government into smaller more autonomous and accountable networked regional specialist bodies. Government will have shifted to give massive emphasis to adaptation measures, especially with regard to adjusting settlement patterns and infrastructure re-routing as well as sustainable affordable construction and retrofitting for climate change proofing. Food security issues will be a concern, but in most cases met by radical changes in consumer behaviour, widespread small scale mosaics of food producers and reintroduction of arable farming in previously unprofitable upland areas and sustainable wetland farming methods.

Economic

Most parts of the region have reduced linkages to global trade networks and supply chains due to lower levels of resource use (especially energy), localisation of production-consumption and shorter supply chains. Negative globalisation impacts manifest earlier in the century – indicative of the UK's short-term comparative decline in world markets – triggered a renewal of regional economic endogenous sustainable activity, driven by readjustments in consumer expectation (*Prosperity without Growth*). This is a steady-state economy, i.e. one with a constant stock of physical capital, maintainable by a low rate of material throughput lying within the regenerative and assimilative capacities of the regional ecosystem. This has been accompanied by lower levels of conventional material wealth amongst the general citizenry and a total systemic shift to indigenous small scale renewable energy generation (phased over 20 years) as a result of the Pan Global Energy Crisis of 2019 (caused by Islamist coups in Saudi Arabia and the UAE). The UK generally does still export expertise in proprietary climate change adaptation approaches, sustainable agronomy, advanced low-carbon ship and glider design and manufacture and IT entertainment products – many of which have spun-out from academic centres of excellence in the Severn Estuary zone. New versions of Local Community Compact Assurance Unions have replaced the outdated and bankrupt insurance subsector in partnership with local democratic institutions. These have developed sophisticated new offerings covering the more pragmatic approach taken to coastal defence and limited types of built environment reconditioning and climate change proofing, both domestic and private sector permitted by local consensus. Energy generation and supply will be predominantly small scale renewable and more or less costly for the consumer.

The replacement of ineffectual national government intervention in economic policy making by a vigorous Welsh Assembly Government and the West Country Regional Assembly has resulted in a largely successful switch in the Estuary to the new sustainable economic paradigm future - of Transition Towns, Energy Descent Adaptation Plans and Steady State Economics etc. New local public infrastructure is largely funded by RegCIL or its successor (Regional Community Infrastructure Levy) and contracted to community-private partnerships to deliver. In most areas it has removed the need for hardly any trans-regional resource allocation by the reduced central government function. Initiatives to develop a New Economic Paradigm based on non-market based notions of wealth creation etc significant earlier in the century and tied to the sustainability/migration agenda have supplied the dominant discourse in most areas of policy making and real economic activity due to

the chaotic systemic failure of the older globalised market economic model in the 2020s and the successful massive introduction of small scale renewable (with residual nuclear energy) sources and generation coincident with the collapse in global oil production (see above).

Social

Coastal squeeze lessens, with residential housing development being focused exclusively more easily defended, less tech-intensive dwellings situated on agriculturally marginal land at higher elevations – the so-called Highland Estates. This will be matched by more diffuse patterns of low-carbon leisure use and national tourism by the majority disinterested in impossibly expensive air travel and long-haul sea transport (virtual technology suites allow everybody an "i-vacation" to wherever they like). Higher levels of lifelong education and exposure to adaptation science and planning will make society more cohesive and resilient to climate change impacts. Communities will accept adaptation costs as necessary social burdens, especially given the greater equalities of wealth; social solidarity and cohesion in most areas will strengthen significantly. Older citizens will remain economically active for a lot longer and remain well (the post-oil world has not successfully innovated to replace defunct market-reliant pension funds – so retirement is not an option anymore, all work cheerfully unto the grave), and will not migrate to the coast as they age but rather remain in their original communities and benefit from familiar social support systems there. Social trauma due to climate change events will be mitigated by implicit generalised social solidarity and risk reduction through periodic transfers of populations within the zone. This will largely occur in a managed fashion and will be regulated by regional and local government in partnership with other stakeholder groups. New less technological and less expensive amenities and social facilities within the context of renewing traditional community structures and activities are developed to support dislocated coastal populations. Training and education constantly supply the populace with alternative more sustainable notions of quality of life and well-being (the management of social expectations), which in turn have caused more general attitudinal shifts and the development of more organic social forms and conventions. In this scenario international climate changed induced immigration may still occur but will be rigidly quotaized and regulated on the basis of a cyclically reviewed *Regional Carrying Capacity Plan* (RCCP). Patterns of intra-regional migration will also be affected by the RCCP's provisions, which will allow for exceptional inflows or outflows of population only in the face of catastrophic climate change events. Economic immigration of younger workers from the developing world will be negligible due to more stringent demographic planning controls and the less conventionally affluent environment.

Technological

Technologies and innovations still diffuse rapidly in this society due to the efficiency of digital communication technologies, and those relating to adaptation will be distributed and adopted with similar rapidity, subject to affordability and appropriateness to the general needs of communities within the estuarial zone. The self-reliant & self-generated posture, i.e. reliance on locally suitable low-tech solutions, is mainstream and consumes less economic and social investment. Since this is always deeply localized it can be highly successful – when it fails to provide wider ranging geographical systemic solutions which are also on occasion necessary however the consequences can be disastrous. Planners are often nowadays also politicians and community social activists, communicators and facilitators, and have a less technocratic professional culture (technical specialist

are bought in if needed). Communications technologies and computer modelling do provide some warning from sudden catastrophic events, but preventative social and infrastructure engineering have reduced the need for emergency response. The low-tech dependent ethos of this scenario is also manifest in localised energy generation, solutions for surface water management and transport etc. Technology also permits more intensive participation in planning by the broader community which is increasingly meaningful and essential and provides a constant, credible and verifiable local evidence base.

Legal

The legal regime is heavily regulatory and prescriptive in planning terms, with incidental derogation when required in the event of emergency as determined by community stakeholders. Planners are adept at localising compliance to EU and national habitat and conservation regulations in situations of lower resource availability and introduction of new energy generation and defence systems utilising simpler technologies whose ecological impacts are easy to gauge. Much adaptation at micro level (e.g. building retro-fitting) will be made legally compulsory where affordable, and non-participation policed at community level by a Climate Change Watch volunteer service. Jurisdictional differences between England and Wales have deepened but unified effective adaptation planning response for the Estuary is developed and implemented pragmatically through the Seven Estuary/Môr Hafren Coalition for Climate Change Adaptation, which is a statutory body. Newer versions of national shoreline management plans (SMP3, SMP4 etc) have statutory status and their recommendations will have the force of law where adopted and interpreted by the regional governments.

Environmental

Natural systems degrade less in the Estuary due to lower levels of coastal economic and social activity as well as the continuance and development of EU regulations regarding habitats. The attenuation of “the material profligacy of consumer society” reduces the depletion rate of natural resources and removes unsustainable burdens on the regional ecosystem. Conservation based on a flexible benefits analysis model is encouraged in all sub-zones and habitats (with some exempt designated areas totally protected), with compensatory habitat creation also supported elsewhere. Resource issues conflicts will largely be decided where possible in favour of reduced development and stabilization/reduction in habitation and human economic activity. Archaeological and built heritage sites will be defended on a variable selective basis dependent on their perceived long term communal significance and use potential. Serious attempts are made to combat species change and provide habitat relocation when and if affordable, introducing biocontrols and refugia where possible, but due to the sheer quantity of change, response is conducted on a strictly triaged needs basis. Water cycle management is however improved due to the low-growth – low-waste global ethos of this future, and the dirigibility of local populations to reduce risk. New forms of harvesting the environment especially in the context of food security and new warmer weather food crops may emerge, adding to existing environmental degradation.

Scenario 4 - Local Reactive

Little Britain

The seemingly least attractive future. A resource starved, regionalized and fragmented set of regions, preoccupied with their own climate change security and adaptation. Emphasis on regional markets, and not focussed on common goods. Uncooperative with regard to the higher national and global systems

Characteristics

- Ineffectual and fluctuating regulation at regional and local level provides few norms and innovations that can be applied and developed over time.
- Localised adaptive responses to climate change are varied and uncoordinated,
- Funding generated from a shrinking regional economic base is distributed unevenly within the region, often without transparency and indicative of party political clientilism.
- Resources are only available for unsystematic low-tech and short-term local government motivated responses to climate change events.
- Spatial planning legislation pertaining to coastal adaptation will have developed spasmodically, reactively and inconsistently from statutes and regulatory regimes established in the earlier part of the century.
- Policy and resource vacuum at the older centralised UK-wide planning and policy making centres, and also tensions between the various actors and stakeholder groups themselves.
- Regional stakeholder hierarchies have difficulty replacing global and national actors due their diffuse nature and mutual competitive positions.
- Predominantly an EDD (Engage-Discuss-Decide) bottom-up approach.
- Inconsistent governmental attention to adaptation measures due to the continuing regional economic crisis and dissolution of communities and social and physical systems.
- Little pre-emptive planning
- Food security issues are major
- Reduced linkages to global trade networks and supply chains due to lower levels of resource availability and capital, disruption of long international supply changes etc.
- Collapse in regional economic activity, not corrected by readjustments in consumer expectation - a shrink-state economy.
- Local disaster insurance initiatives are weak and underfunded.
- Rough and ready local pragmatic approach to coastal defence and limited types of built environment reconditioning and climate change proofing, both domestic and private sector
- BRIC dominated global economy the region's goods and services are uncompetitive and perceived as low quality
- RegCIL or its successor (Regional Community Infrastructure Levy) is inadequate and is no longer supplemented by trans-regional resource allocation

- Coastal squeeze lessens, with low-cost emergency residential housing development being focused exclusively on more easily defended, less costly dwellings on marginal land
- Communities do not accept adaptation costs as necessary social burdens, especially given inequalities of wealth; social solidarity and cohesion in most areas will decline significantly.
- Training and education fail to supply the populace with more comforting and optimistic notions of how to accept lower standards of life and well-being.
- Out-migration from the region will be on a large scale, driven by economic need and climate change events.
- Technologies and innovations diffuse slowly due to the backwardness of digital communication infrastructures,
- Dislocations and social disharmony preclude participation in planning by the broader community which is increasingly alienated and untrusting
- Legal regime is heavily regulatory and prescriptive in planning terms.
- Jurisdictional differences between England and Wales have deepened and there is no unified effective adaptation planning response for the Estuary as a whole.
- Natural systems degrade at accelerated levels in the Estuary due to higher levels of coastal pollution and unregulated social and economic activity as well as the declining potency of EU regulations regarding habitats.

Narrative

Political

Public opinion is ambivalent and supplies no consensus on how to develop effective Estuary specific adaptation planning. Ineffectual and fluctuating regulation at regional and local level provides few norms and innovations that can be applied and developed over time. UKCIP, EU and IPCC higher level climate change science research has not delivered accepted scientific proofs of future change and is the subject of much embedded scepticism among the regional political class, thus affecting the quality of regional level adaptive systems. Localised adaptive responses to climate change are varied and uncoordinated, depending on the perceived scarcity of resources available and scant reference is made to exemplars/models of similar localised proactive planning in other parts of the UK and Ireland. The regional devolved government in Wales's acts independently where possible of EU and UK higher policy implementation - this is also apparent in S-W England, where local adaptation is part of the remit of the West Country Regional Assembly. With much political rhetoric, the gradually reduced money for funding generated from a shrinking regional economic base is distributed unevenly within the region, often without transparency and indicative of party political clientilism. Sufficient resources are only available for unsystematic low-tech and short-term local government motivated responses to wildcard climatic change events on the Katrina scale, whatever the type or scale of communities affected. Local political representation will be more significant than national or EU. Spatial planning legislation pertaining to coastal adaptation will have developed spasmodically, reactively and inconsistently from statutes and regulatory regimes established in the earlier part of the century by the regional assemblies. The decentralization tendencies of regional government with regard to coastal adaptation actions are fuelled by a policy and resource vacuum at the older centralised UK-wide planning and policy making centres, and also tensions between the various actors and stakeholder groups themselves. Regional stakeholder hierarchies will have

difficulty replacing global and national actors in instituting policy and adaptation measures impacting locally, due their diffuse nature and mutual competitive positions. This is a product of the unavailability of significant investment funding, due to a contracting local economic base, to engineer resilience to change. Government will be, at least in theory, a very predominantly an EDD (Engage-Discuss-Decide) bottom-up approach. These trends will be augmented by changes in the machinery of democracy, with continued reorganisations of units of local government into smaller less competent but more accountable, competing and discrete regional specialist bodies. Government will only devote inconsistent attention to adaptation measures due to the continuing regional economic crisis and dissolution of communities and social and physical systems. This results in little pre-emptive planning – rare adjustments of settlement patterns and infrastructure re-routing as well as minimal sustainable affordable construction and retrofitting for climate change proofing. Food security issues will become very major: consumer behaviour and expectations change little but domestic production is stymied by lack of capital and access to petrochemical fertilizers etc and there is little innovation in agricultural practices, crop types etc.

Economic

Most parts of the region have reduced linkages to global trade networks and supply chains due to lower levels of resource availability and capital, disruption of long international supply changes etc of production-consumption and shorter supply chains. Globalisation impacts, manifest earlier in the century – indicative of the UK's short-term comparative decline in world markets – have accelerated apace. They have caused a collapse in regional economic activity, not corrected by readjustments in consumer expectation or the discredited utopian steady state economic paradigm and its acolytes in the sustainability movement (it's really *No Prosperity without Growth*, sorry). This is a shrink-state economy, i.e. one with a diminishing stock of physical capital, the regional ecosystem blessed with declining regenerative and assimilative capacities. This has been accompanied by lower levels of conventional material wealth amongst the general citizenry and the limping continuation of mixed systems of industrial scale renewable, nuclear and also coal-powered energy generation (not phased out as planned) necessary due to the Pan Global Energy Crisis of 2019 (caused by Islamist coups in Saudi Arabia and the UAE). The region's share of the UK's exports is reducing in a BRIC dominant world economy, with some exceptions based on traditional urban-academic centres. Economic infrastructure is neglected and outdated. The national insurance industry's half hearted response to coastal adaptation has created several coastal residential dead zones - so-called Ghost Estates - in areas at risk of flooding. Local disaster insurance initiatives are weak and underfunded. These reflect the rough and ready local pragmatic approach to coastal defence and limited types of built environment reconditioning and climate change proofing, both domestic and private sector defined by very limited funding.

The replacement of ineffectual central government intervention in economic policy making by a divided Welsh Assembly Government and the feeble West Country Regional Assembly has not resulted in any significant combating of general regional decline. In a BRIC dominated global economy the region's goods and services are uncompetitive and perceived as low quality – a continuous vicious cycle of disinvestment, de-skilling and isolation has seen to that. Localised manufacture of low value basic products has revived due to reduced access to lengthy international supply chains. New local public infrastructure is largely funded by RegCIL or its successor (Regional Community Infrastructure Levy) as well as a range of other indirect taxes, and contracted to

community-private partnerships to deliver. In most areas it is inadequate and is no longer supplemented by trans-regional resource allocation from a reduced central government function. Initiatives to develop a New Economic Paradigm based on non-market based notions of wealth creation etc significant earlier in the century failed to replace the failing market economy model. In most areas policy making and economic management muddle along based on anachronistic frameworks and concepts *faute de mieux* – it has been thus since the chaotic systemic crisis of the globalised market economic model in the 2020s and the subsequent regeneration of Neo-Globalization, limited to BRIC states and core areas of production and finance in Europe and North America.

Social

Coastal squeeze lessens, with low-cost emergency residential housing development being focused exclusively on more easily defended, less costly dwellings situated on agriculturally marginal land at higher elevations or brown-field land in defended city centres. This will be matched by negligible patterns of low-carbon leisure use and the demise of nearly all forms of national tourism by the impoverished majority due to impossibly expensive air travel and long-haul sea transport (Victorian style train day-trips will re-emerge however). Levels of lifelong education and exposure to adaptation science and planning will nosedive due to lower levels of affluence, making society less cohesive and resilient to climate change impacts. Communities will not accept adaptation costs as necessary social burdens, especially given the inequalities of wealth; social solidarity and cohesion in most areas will decline significantly. Older citizens will remain economically active for a lot longer whatever their state of health - the social welfare and care systems only function as a Medicare safety net for the very poor and few have adequate pensions or savings – so retirement is not an option anymore, all work glumly unto the grave. They will not migrate to the coast as they age but rather remain in their original communities to benefit from whatever familiar social support systems that still exist there. Social trauma due to climate change events will be exaggerated and so reduce social solidarity, and risk reduction will occur as a side effect of periodic "flights" of destitute populations to less impacted areas elsewhere in the UK hinterland. This will largely occur in a disorganised fashion, unregulated by regional and local government or any other stakeholder groups. Old technology and lower quality amenities and social facilities within the context of decaying traditional community structures and activities are in places co-opted to support dislocated coastal populations. Training and education fail to supply the populace with more comforting and optimistic notions of how to accept lower standards of life and well-being, which in turn have caused chronic civil unrest, crime and the development of parallel subversive social forms and conventions. In this scenario international climate-changed induced immigration may still occur but will be unattractive due to economic decline and extremist nativist regional movements and the evident contraction in the social carrying capacity of the region. Out-migration from the region will be on a large scale, driven by economic need and climate change events. Economic emigration of younger workers from the region to the developing BRIC economies will be significant factors in compounding accelerating demographic decline.

Technological

Technologies and innovations diffuse slowly in this society due to the backwardness of digital communication infrastructures, and those relating to adaptation will be distributed and adopted

with similar inefficiency and tardiness, subject to affordability and appropriateness to the general needs of communities within the estuarial zone. The self-reliant-low-resource generated posture, i.e. reliance on locally suitable low-cost solutions, is mainstream and consumes little economic and social investment. Since this is often spasmodic and reactive, it can also often be very unsuccessful and damaging – it usually fails to provide wider ranging geographical systemic solutions when they are very necessary, with disastrous consequences. Planners are professional civil servants and enjoy significantly increased personal authority and powers in a less technocratic professional culture (technical specialists can on occasion be bought in when responding to major climate change events). Communications technologies and computer modelling are not considered reliable to provide warning of sudden catastrophic events, but deteriorating social and community coastal infrastructure (depopulation) have reduced the cost of emergency response regardless. The low-tech dependent ethos of this scenario is also manifest in old technology localised energy generation, patch & mend solutions for surface water management and transport etc. Dislocations and social disharmony preclude participation in planning by the broader community which is increasingly alienated and untrusting and provides a constant, angry and critical watch on the regional government's inaction.

Legal

The legal regime is heavily regulatory and prescriptive in planning terms, with frequent derogation when required in the event of emergency as determined by community stakeholders. Planners dead-letter irrelevant compliance to obsolete EU and national habitat and conservation regulations, due to very low resource availability and the necessities of preserving existing energy generation and defence systems utilising older and dirtier technologies whose ecological impacts are typically negative. Adaptation at micro level (e.g. building retro-fitting) only occurs on public buildings as a matter of course – private citizens and community groups do their own at will, subject to paying hefty planning fees. Non-participation is the norm. Jurisdictional differences between England and Wales have deepened and there is no unified effective adaptation planning response for the Estuary as a whole. Newer versions of national shoreline management plans (SMP3, SMP4 etc) lack statutory status and their recommendations have not been fully adopted by the regional governments on cost grounds and because of popular protest and mistrust.

Environmental

Natural systems degrade at accelerated levels in the Estuary due to higher levels of coastal pollution and unregulated social and economic activity as well as the declining potency of EU regulations regarding habitats (the precautionary principle is often ditched). Even though attenuation of "the material profligacy of consumer society" does reduce the depletion of natural resources etc, survivalist/black economy actors cause havoc dumping waste and appropriating public infrastructure and materials covertly. Conservation is perceived as regrettably unaffordable in its purist form, apart from a few sites of totemic significance e.g. Slimbridge and some other designated areas. Compensatory habitat creation is not supported. Resource issues conflicts will largely be decided where possible in favour of strategic development and stabilizing habitation and human economic activity. Archaeological and built heritage sites are rarely defended since their perceived long term communal significance and use potential is minimal. Few attempts are made to combat species change and provide habitat relocation when and if affordable, due to the sheer volume of changes

and lack of will or resources (exceptions are only made when agricultural productivity is directly affected). Water cycle management remains at previous levels despite the low-growth – low-waste global ethos of this future, and the flight of local populations (which has the effect reducing the risk). New exploitative forms of harvesting the environment especially in the context of food security are encouraged and managed, aggravating existing environmental degradation.

C. DRIVER CLUSTERS - grouped by PESTLE category

POLITICAL

International & EU Guidance and Regulation

International consensus > Public Opinion

Changing EU Policy & Expression/ Interpretation at UK levels

Scale & style of government: Local v. National, National v. International

EU intervention, regulation, relative importance

Increasing role of EU

Implications of devolution

Political status of Wales

Disparity in power > devolution

Ideological change and stasis

Political priorities > funding

Level of centrality of government

Change in political philosophy (e.g. from economics to X)

Political responses and interventions in response to wild card events e.g. Katrina, 1608, 1953 etc

External extreme events > political mind sets

Political impact of adaptation measures

Lack of consensus on emissions scenarios

Legislative Influence

Development of spatial planning / law

Centralisation v. Regionalisation , Direct v Indirect government: tension

Political Consensus: central and local

How government delivers its functions through quangos etc (local government)

Stakeholder hierarchies

Move to greater localisation

Increased local resilience

Localism – power of communities and level of representation

EDD (bottom up) versus DAD (top down): level of stakeholder involvement in decision-making (power and legitimacy)

Changes in the machinery of democracy (voting systems and boundaries)

Sectoral Conflicts

The Global Business + influence of the private sector

Insurance practices

Insurance > socio-economic blight

Nature of Government

Relative emphasis of government policy regarding adaptation and mitigation

Political cycle (national) > style of government

Carbon economy – political expression of this

Tiers of governance > centres of power

Politically driven level of housing & infrastructure

Security and the State

Food security policy – changing emphases re. Agriculture and urbanization

ECONOMIC

Resource scarcity and management

Declining resources base

Changing recognition of the real value of natural and historic resources

Globalisation impacts

UK comparative decline

Continued boom-bust – less money available for adaptation and science

UK competitiveness for global resources. impact on money for adaptation

Economic insecurity for investment

Reduced public funding and investment > more prioritisation (including regional priorities) at UK level

The Debt - Economic Cycles

Increased threat of blight

Reduced capacity to resource within local authorities

Reactive, short-termist investment

Economic cost reduces willingness to use new technologies

Systemic adjustment

Response to building on the economic benefits /negative impact of climate change

Increased business planning > leading to confidence & continuity

Insurance sub-sector

Changing insurance industry model

Globalisation

Rise and development of global capitalism. Changing distribution of wealth

Change of value of local resource/industrial activities in the world markets

Energy sector

Energy: transition to new sources > price inequalities

Agrarian

Food security

Devolution > decreasing competitiveness

Divergent performance of the Welsh versus English economy > wealth creation. Tax base (local) – declining yield

Infrastructure Funding

Shift from public to private funding of infrastructure. Other sources of funding e.g. Europe will also change

Impact of CIL (Community Infrastructure Levy) region-wide

New Economic Paradigm

Environmental valuation of resources and activity

Move towards green low carbon economy

Increased use of Polluter Pays Principle in taxation

Revised value system, including re externalities (health, environment)

Changing of local authority spending resource

Macro economic context (high level)

National resources, post oil economy, impact on the estuary

Regional and local economy – development and relative importance

Physical displacement of economic activity

Business relocation due to climate change

Increased beneficiary payments towards adaptation mechanism

SOCIAL

Coastal Pull & Squeeze

Inherent attraction of the coast to society > movement of people to coast

Migration > exacerbation of coastal squeeze

Tourism and the transient populations associated with it

Adaptive capacity

Society's capacity to adapt (fast or slow)

Acceptance of community cost to adaptation

Demographics & Population Movements

Demographic change affecting ability to act Demographic change – population, ageing, household size

Changing population pressure along the coast

Migration and mobility (environmental, Internal, external)

Demographic ageing, change in social profile > older citizens suffer from "attitude lag" re climate change and adaptation

Social trauma

Threats to social cohesion

Continuing inadequacy of social responsibility

Attitudinal change regarding e.g. leisure, the sea, transport, risk etc

Social engineering v. Social choice

Better social scope to planning

Existence of existing development constraints, societal choice

Divisive impact of adaptation policies

Quality of Life Agenda

Social Amenities / Services

Wellbeing / Quality of life

Quality of life issues, including changing expectations

Social justice

Equality > insurance access and engagement

Increased need to provide for vulnerable groups

Social construction of property

Property relationships (nature of tenure) and related attitudes

Education & Training

Education – preparing society for adaptation – skills and attitude

Willingness and valuation > legitimacy, supply resource, allocation of scarce resources (value systems)

Local activisms

Nimbyism – localism versus physical manifestation of adaptation (managing of social expectations)

Attitudinal change

Public appetite/attitude to climate change risk and responses

Increasing public recognition and acceptance of the need for adaptation (including the role of media)

Changing behaviour in response to changing climate e.g. more use of outdoor space

Increased public involvement in planning

TECHNOLOGICAL

Tech innovation and diffusion

Increased use of new technologies (adaptation in buildings defences and transport)

Increasing availability of cost-effective, affordable adaptation technologies (and appropriate)

Flexible TCP response to new technology

Solution dependency

Techno-fix posture at local and district level for adaptation (and also its flip side in coping with negative impacts)

Changing levels of trust to technology

Willingness to gamble with the future

Global geotechnical solutions mitigating climate change impacts

Tech appropriate to place

Locational impacts of adopting new technology

Training and knowledge

Better understanding of science/technology by TCP

Increased TCP input to SMPs (? improve status of planners)

Increasing planners' awareness of new technology including international experience

Predictive/response advantage

Science and understanding - estuary/flood risk/paleoclimate/computers

Communication technologies – early warning systems – changing need for travel

Emergency response technology

Better resource/infrastructure management and adaptation

Energy production technologies (resources)

Building design and retrofitting (enables self protection)

Localism (local source energy and resources e.g. crops)

Transport – innovation, attitude change, personal /group transport

Infrastructure – significant technological failure

Transport technology change > patterns of use and infrastructure

Improvement in climate change science including monitoring, modelling and mapping (for impacts too)

Balance of technological solutions on the ground including surface water management

Smart energy generation and use > collocation, efficiency and distribution

Renewable – new uses and types of storage

Changing pressures due to transport technology

Tech-led policy response

Policy adaptation to new technologies – central and local

Technology allowing increased participation

LEGAL

Legislative responses

Political will to deliver legal opportunities

Increased use of legal tools for adaptation

UK legislation various

Statutory SMP3, SMP4?

Juridical practice and conventions

The need for inconsistent decision –making – case by case

Recognition of the inflexibility of environmental law e.g. for habitats

Increasing complementarity between building inspectorate and TCP

Criminalization of environmentally incorrect behaviours

Location of policy within government

Regulation – local and global

Land use regulation and access

European dimension – directives etc (World Legislation)

Compulsory building retrofitting, flood proofing

International treaties including adaptation

EU and national water legislation framework directives > make compliance more difficult (includes the Marine and Coastal Access Bill)

Institutional changes and regulatory independence

Conflict of laws

Jurisdictional conflict and difference between England and Wales

Human rights

Interference in individual rights: application of directives

Human rights including intergenerational class actions...

Property and Insurance law

Civil law – conveyancing, reliability service provision

Legislative innovation

Increased use of TCP legal tools e.g. CIL (Community Infrastructure Levy)

Waste regulation

Role of legislation and policy to manage adaptation – perception

Consultation, information, public participation

Permeation of legal solutions and responses

Increasing global framework for adaptation

Increased scope and stringency of EU legislation

Increased confidence of LDAs to defend adaptation decisions at appeal and in law

Increased risk of litigation by the public

Increasing workload in conforming to a plethora of legal requirements and policy (confusion and checking)

More legal mechanisms for enabling retrofitting

ENVIRONMENTAL

Increasing degradation

Continuing impact on natural systems

Regulation – all levels

Improved interpretation of habitat regulations in the UK

Public perception of EU quality

Resource management issues and conflicts

Reduced/changed water resource for planning to manage

Extreme events

More extreme environmental events which prompts action

Climate change phenomena – storminess, rainfall, temperature change

Sea level rise: erosion, accretion, rapid step changes

Climate change: change of state & extreme events

Ecosystems approach / "Green Solutions"

Increased priority of ecological connectivity

Increased recognition of historic environment

Ecosystem services, system based approach

Increasing use of green infrastructure solutions (and blue)

Species change and migration

Numbers of new migrating species

Species change and habitats > implications of legislation etc

Ecological including habitat changes (loss/species changes) and fish – all ecosystems/media

Water management

Water – variable supply, flooding, SUDS

Green Infrastructure – designations, "What is natural?" dynamic protection

Improved water cycle management

New/extended forms of economic exploitation

New forms of exploiting the environment (harvesting?)

Siltation/ sedimentation changes human induced e.g. dredging

Pollution impacts

Pollution side effects – landfill effluent, run-off

Relation to historic landscapes

Protection of historic and archaeological environment

Metrics/indices of change & response

Climate change (parameters….) - sea level rise, rainfall etc

Increasing sound, available, credible, appropriate science > use

Environmental tolerances

Conservation at all costs? Limits? Range/migration

Environment+ human resource – carrying capacity of receiving environment waste water, waste water network