



DECC

## SEVERN TIDAL POWER - SEA TOPIC PAPER

### Landscape and Seascape

April 2010

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## **ABBREVIATIONS**



## ABBREVIATIONS

The following abbreviations are used in this Topic Report:

AONB	Areas of Outstanding Natural Beauty
BAP	Biodiversity Action Plan
BERR	Department for Business, Enterprise and Regulatory Reform
BTO	British Trust for Ornithology
CCW	Countryside Council for Wales
CHaMP	Coastal Habitat Management Plan
cSAC	Candidate Special Area of Conservation
DECC	Department of Energy and Climate Change
Defra	Department for Environment, Food and Rural Affairs
EIA	Environmental Impact Assessment
EC	European Commission
ELC	European Landscape Convention
EU	European Union
GIS	Geographical Information System
GW	Gigawatts
HRA	Habitats Regulations Assessment
HLOHIW	Historic Landscape of Outstanding Historic Interest in Wales
LCA	Landscape Character Assessment
LNR	Local Nature Reserve
MLWS	Mean Low Water Spring
MW	National Character Areas
NCA	Megawatts
NE	Natural England
NERC	Natural Environment and Rural Communities Act
NNR	National Nature Reserve
NP	National Park
NPS	National Policy Statement
ODPM	Office of the Deputy Prime Minister
PPG	Planning Policy Guidance
PPS	Planning Policy Statements
PSA	Public Service Agreement
PWS	Public Water Source
RIGS	Regional Important Geological Sites
SAC	Special Area of Conservation
SDC	Sustainable Development Commission
SEA	Strategic Environmental Assessment
SLR	Sea Level Rise
SNCI	Sites of Nature Conservation Importance
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
STP	Severn Tidal Power
TAN	Technical Advice Note
TWh	Terrawatt hours
UKCIP	United Kingdom Climate Impacts Programme
UN	United Nations
VVI	Visually Verified Images
WeBS	Wetland Bird Survey
WFD	Water Framework Directive
WHS	World Heritage Site
ZTV	Zone of Theoretical Visibility



## **NON TECHNICAL SUMMARY**





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## NON TECHNICAL SUMMARY

### Introduction

A strategic environmental assessment (SEA) is being conducted as part of the Severn Tidal Power (STP) feasibility study, in accordance with the requirements of the EU SEA Directive and UK Regulations. The SEA comprises two phases: Phase 1, the scoping stage, has already been undertaken. This [landscape and seascape] topic paper forms part of the reporting arising from Phase 2, the main assessment of short-listed options.

### Consultation

The following consultation activities have been undertaken:

- Phase 1 Technical Workshop held in Bristol in July 2008
- Scoping consultation in January 2009
- Phase 2 Technical workshops held in Cardiff in June 2009 and Bristol in December 2009
- Telephone conference updates between technical workshops
- Direct meetings with key consultees.

### SEA Objectives

SEA Objectives have been developed to enable alternative options to be compared. Objectives may not necessarily be met in full by a given alternative option, but the degree to which they do will provide a way of identifying preferences when comparing effects of alternative options. The SEA Objectives for this topic are listed below:

- Objective 1 - To conserve the character and qualities of the landscape/seascape, recognising its diverse features and distinctiveness at different scales – including designated and non-designated areas.
- Objective 2 - To conserve the character and qualities of the physical and visual resource associated with land and sea.
- Objective 3 - To accord with the Aims and Articles of the European Landscape Convention

### Definitions and study area

For the purposes of this non-technical summary paper the following definitions are given:

Landscape – is defined as a zone or area as perceived by local people or visitors, whose visual features and character are the result of the action of natural and/or cultural (that is, human) factors. The above definition is given by the European Landscape Convention (ELC) Explanatory Notes.

Seascape - 'An area of sea, coastline and land, as perceived by people, whose character results from the actions and interactions of land and sea, by natural and/or human factors.' Seascape is considered to be a subset of landscape.

The study area was set by defining a line 35km around all the alternative options being considered in line with recommended practice. This area is shown on Fig STP-LS-0001.

The landward extent of study is broadly set at 10km from the coast. This distance is considered as the distance where the coast ceases to have an obvious physical or perceptual influence on the landscape.

### Baseline Environment

Baseline information provides the basis for predicting and monitoring environmental effects, by describing the area that may be affected. Due to the long timescales associated with the construction and operation of alternative options, baseline information is considered over three time periods, to

reflect the predicted changes in the area when considered without the development of a Severn Tidal Power project. The baseline therefore also describes the estuary in a 'do-nothing' scenario.

#### *Baseline environment up to 2009*

The Severn Estuary has many landscape and Seascape Character Areas both at a local and regional level, however they all combine to form the single entity that is perceptually considered to be the Severn Estuary. It is this great variety in landscape and seascape type that should be first noted.

In terms of seascape characteristics the estuary ranges from the appearance of a wide river in its upper stretches, through the visual intricacies and textural variety of the estuary with its mud and sandbanks to the open sea bounded by cliffs, sandy beaches and muddy bays. Its waters are muddy, turbulent and wide when viewed from the shore.

However the great natural scale of the estuary has been spanned by the two Severn bridges across its waters, albeit at a narrow point of the estuary. The bridges act as a visual reference in the upper estuary and are local landmarks.

The landscape looking down onto the Severn Estuary is also varied. It includes high ground which affords expansive views out over the estuary such as the Quantocks, Brean Down and the South Wales Valleys ridges above Cardiff. In contrast there are considerable stretches of flat low lying ground butting up to the Severn such as the Gwent and Somerset Levels.

The topographical conditions combine with land-use to give the present landscape character around the estuary. At points it is highly industrial in nature such as Cardiff dock and Avonmouth whilst in contrast agricultural land-use is still prevalent along both shores. Culturally some of the coastal settlements have developed as resorts to prosper from holiday makers such as Barry Island and Weston Super Mare where others have their historical function routed in industry and commerce such as Newport and Lydney.

Power production in the form of Hinkley Point, Aberthaw, Oldbury and their pylon lines have created modern landscape features within the scene, whilst natural features include the massive 'finger' of rock Brean Down pointing out into the estuary at the twin islands of Steep Holm and Flat Holm. These features act as landmarks and are visible from around the estuary's shore, from the water itself and from parts of the surrounding high ground in both Wales and England.

Currently its key environmental issue in landscape terms is protecting its varied and distinct landscape types and qualities. This is under the risk of change brought about by insensitive development around existing settlements. Likewise infrastructure projects could alter the key characteristics of parts of the Severn's surrounding landscape in terms of new road and power generation projects.

In seascape terms the key environmental challenge relates to sea-level rise. This change is barely perceptible to observers with a gradual reduction in intertidal habitats or a narrowing of saltmarsh fringes around the estuary. However at times the change in seascape and coastal character is marked when there is the need to construct new sea defences such as rock armouring or sea walls within settlements.

Finally the Severn Estuary acts as backdrop to many people's lives that live and work around it. It acts as a draw for holiday makers as well as providing a transportation route for shipping. It has rich historical connections but is also the scene for modern industry and commerce. It is a place of great contrast and visual richness with its daily change of character brought about by the tides.

The following statutory or Welsh Assembly Government designated landscape and seascape areas exist within the study area as illustrated on STP-LS-0003:

National Parks (NP)	Heritage Coast (HC)	Areas of Outstanding Natural Beauty (AONB)	Landscapes of Outstanding Historic Value in Wales (Historic Landscape)
Brecon Beacons NP	Glamorgan HC	Cotswolds AONB	Gwent Levels Historic Landscape
Exmoor NP	Exmoor HC	Wye Valley AONB	
		Mendip Hills AONB	
		Quantock Hills AONB	

Their statutory listing means that these landscapes and seascapes are considered to be more significant than other non-designated areas. However all landscapes whether designated or not have a value and have the potential to have their quality improved even if degraded. This approach is in accordance with the European Landscape Convention (ELC) which considers all landscapes to have value.

*Future baseline during construction: 2014-2020*

It is considered that the general landscape and seascape characteristics of the estuary are not likely to change significantly over the next ten years. The only recognisable changes are likely to relate to built development. These are likely to include redevelopment at existing power stations including new transmission lines and new port facilities. Such development may place new features within the general scene but the overall landscape, seascape and visual characteristic across the wider estuary would not perceptually change.

However an imperceptible change would have commenced with sea level rise starting the process of saltmarsh erosion around the estuary and reduction in the intertidal reach at low tide. This change may be noted through study and careful observation on the estuary but the ordinary layperson is unlikely to notice it.

*Future baseline during operation 2020-2140, decommissioning and longer term trends*

The Severn Estuary is a dynamic body of water and erosion and deposition will continue. The Defra publication Futurecoast makes predictions as to how seascape units could change over the next century. The following abridged predictions relate to changes in the Severn Estuary;

- Deepening of westward facing bays such as the Bridgwater Bay.
- Likely recession of 'soft shores' such as the Steart Peninsula.
- Rocky shores or cliffs such as Clevedon or Lavernock Point will resist erosion.
- There could be significant change to watercourses flowing into estuary with possible breaches of river banks redirecting flow.

This is not to say that these effects would be allowed to come to pass as schemes of work could be developed to address many of these changes, particularly if they have significant adverse effects on residential areas or commercial interests. This in itself would lead to changes to local seascape and landscape character areas if further sea defences were constructed around the estuary.

Sea level rise is predicted to continue and the effects become more pronounced. The lower parts of inter-tidal areas such as the mudflats at Weston Super Mare would be permanently submerged whilst such features as saltmarsh at the top of the tidal range could become subject to erosion from greater wave energy. The reduction of saltmarsh from such places as the Welsh Grounds would mean the reduction of a particular seascape and coastal type from the estuary.

With regard to built development no strategies attempt to look so far forward as 120 years so the predicted effects are observations considering current trends and likely demands. It is unlikely that

any major new settlement would be developed on the coastal fringe around the estuary due to existing flood risk. However existing settlement are likely to experience increased development of residential properties in line with current predictions of population growth and a trend towards smaller living units.

The future planning system is likely to define development areas tightly with a foreseeable result of very distinct areas being designated for different purposes. For example industrial development would be separate from residential areas being distinct from recreational locations and the surrounding agricultural land. Current large industrial plants such as the South Wales steel mills may be closed and the sites re-developed into smaller units without the same visual presence or cultural associations within the landscape.

As pressure for low carbon food and increased self-sufficiency increases the importance of agricultural areas for food production is likely to rise. It is difficult to predict the specific landscape characteristics of the surrounding agricultural land and which may change as conflicting pressures would influence its future management. These pressures are likely to include intensification of farming to increase yield compared to the desire to improve ecological diversity in the countryside. Pastoral farming could significantly decline in favour of arable and vegetable crops as they require less energy and investment to grow.

A further potential change to agricultural land use would be the predicted increase in national afforestation. Currently woodland cover in the UK is 12% and the Forestry Commission has announced initiatives to increase this to 16% over the next 40 years for a range of purposes including wood fuel production and atmospheric carbon sequestration.

Finally it is reasonable to state that in the future there will continue to be a demand for power, transport links and leisure pursuits situated on and around the estuary.

Power generation may take many forms but the drive for renewable energy is likely to lead to both onshore and offshore wind turbines around and in the estuary. Extensive areas of wind farms would lead to a significant visual effects and change to the existing landscape and seascape characteristics if built within the actual Severn Estuary. Current wind farm trends are to use larger turbines positioned further out to sea so visual effects are minimised. Existing nuclear power stations are planned to remain for the beginning of this period. Coal burning power stations such as Aberthaw are likely to stop generating electricity but the site could well be re-developed with new industrial uses.

Communication routes such as road, rail and sea shipping would remain. The Severn Bridges, especially the original Severn Crossing may reach the end of its safe, useful life expectancy and require replacing or major refurbishment. Sea freight is likely to remain an important feature of the Severn Estuary with large container ships accessing Avonmouth. The success of smaller ports such as Sharpness Docks is not as easy to define. They could fail completely with no demand or blossom in a transport renaissance when it is cheaper and environmentally more sustainable to convey goods by ship, rail and inland water.

Demand for leisure pursuits are anticipated to remain with a predicted increase of the use of local areas by holidaymakers and people seeking recreational activity as transport costs rise. Since the start of mass tourism in Britain the seaside has provided a readily accessible place to recreate. This general demand is predicted to remain but develop more specifically towards activity based holidays and eco-tourism where the quality of the surrounding environment and the uniqueness of place are critically important.

### Key Environmental Issues

Summarised below in bullet form are the key existing environmental issues as they relate to the Severn Estuary's existing landscape and seascape.

- Sea level rise altering the seascape characteristics and visual appearance of the intertidal zones within the estuary.
- Coastal erosion again linked with sea level rise that may lead to construction of new hard, sea defences around the estuary.
- Change to existing coastal landscape and land-use should areas not prove economical to defend against coastal flooding and are subjected to regular inundation.
- Aligned with the above point is a foreseeable drive for an increase in habitat creation for such as a saltmarsh, reedbed or re-wetting the Somerset or Gwent Levels Historic Landscape.
- Demand for onshore and offshore wind power development.
- Development pressure within and around existing settlements for commercial and leisure projects.
- Change in agricultural areas around the estuary as a result in changing food demands or drive to plant woodlands.
- Pressure to protect environmentally sensitive habitats or destinations so they do not succumb to any of the above issues. This could result in the pressure to build further sea and river defences or more actively manage water levels at these sites.

### Evaluation of Plan Alternatives

#### Assessment Methodology

The SEA Directive specifies the criteria that should be taken into account when determining the likely significant effects of the plan and thus these criteria have been adopted throughout the assessment process of this SEA. This topic paper therefore considers the characteristics of the effects and of the area likely to be affected.

This topic has also used the following specific assessment methods.

- Desk based study to utilise existing information.
- Extensive site visits around the estuary to inform the consideration of potential visual effects and change to landscape and seascape characteristics.
- GIS modelling of the Zones of Theoretical Visibility associated with each of the alternative options.

#### Alternative Options

There are five shortlisted alternative options that are being assessed within Phase 2 of the SEA for their likely significant effects. The key parameters associated with the alternative options are:

Alternative	Location	Length (approx)	Operating mode	Turbine type	No. turbines	Annual energy output	Caissons	Locks
B3: Brean Down to Lavernock Point Barrage	Lavernock Point to Brean Down	16km	Ebb only	Bulb-Kapeller	216 (40MW)	15.1 to 17.0 TWh/year	129	2
B4: Shoots Barrage	West Pill to Severn Beach	7km	Ebb only	Bulb-Kapeller	30 (35MW)	2.7 to 2.9 TWh/year	46	1
B5: Beachley Barrage	Beachley to land directly to the east on the English side	2km	Ebb only	Straflo	50 (12.5MW)	1.4 to 1.6 TWh/year	31	1



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## Assessment of Likely Significant Effects on the Environment

### Alternative Option B3: Brean Down to Lavernock Point Barrage

- Significant adverse landscape effect on the Welsh side with the existing landscape features of Lavernock Point being lost or significantly changed.
- Significant adverse effect on the landscape areas of Brean Down and Brean Beach and their appearance at the English landfall.
- Significant adverse seascape effect with a highly noticeable man-made structure set within the open sea.
- Changes to the intertidal zone upstream of the barrage adversely affecting the wider seascape character of the Severn Estuary, The Shoots and the Upper Severn Estuary.
- Secondary adverse visual effect from ancillary works associated with large construction compounds and new road infrastructure required to build the B3 Barrage. This effect would occur on both sides of the estuary and significantly alter existing landscape character of both.
- Increased pressure for recreational use of the higher waters upstream of the barrage for watersports or coastal development with a resulting loss of tranquil or undeveloped areas.
- Potential significant effect relating to the power transmission lines depending on their routing away from the barrage to reach the national grid.
- Potential for further visual intrusion from the development of new substations near the landfalls.
- The reduction in the intertidal zone in rivers away from the estuary although this may be considered a positive effect in certain towns.
- Creation of a major new night-time feature as a linear feature of strong illumination stretches out across this dark part of the estuary.
- A significant perceptual change about the estuary, especially upstream of the barrage as it becomes 'tamed' by this large barrier and the extent of tidal change is reduced.

### Alternative Option B4: Shoots Barrage

- Significant adverse effect on the landscape character of the Gwent Levels Historic Landscape at the Welsh landfall.
- Significant adverse seascape effect with the loss of the estuarine pattern of sand, mud and rock being built over by the barrage through The Shoots section of the estuary.
- Changes to the intertidal zone upstream of the barrage adversely affecting the estuarine character of The Shoots and the Upper Severn Estuary.
- Secondary adverse visual effects from ancillary works associated with large construction compounds and new road infrastructure required to build the B4 Barrage. This effect would occur on both sides of the estuary but be particularly noticeable in the Gwent Levels Historic Landscape.
- Potential significant effect relating to the power transmission lines depending on their routing away from the barrage on the English side.
- Increased pressure for recreational use of the higher waters upstream of the barrage for watersports or coastal development with a loss of tranquil or undeveloped areas and a resulting change in landscape characteristics.
- The reduction in the intertidal zone in rivers upstream from the barrage most notably Chepstow affecting the townscape character of the settlement.
- Increased illumination and change to the existing dark, night-time landscape characteristic of the Gwent Levels Historic Landscape.

### Alternative Option B5: Beachley Barrage

- Significant adverse effect on the landscape characteristics and therefore the wider landscape character of the Beachley peninsula on the north bank of the estuary.
- Significant adverse seascape effect with the loss of the estuarine pattern of sand, mud and rock being built over.

- Significant changes to the intertidal zone upstream of the barrage adversely affecting the estuarine seascape features of the Upper Severn Estuary and removing the sight of sandbanks, rock and river channels through the bed of the estuary.
- Increased pressure for recreational use of the higher waters upstream of the barrage for watersports or coastal development with a loss of tranquil or undeveloped areas and a resulting change in local landscape character.
- Secondary adverse visual effects from ancillary works associated with large construction compounds and new road infrastructure required to build the B5 Barrage. This effect would occur on both sides of the estuary but be particularly noticeable on the Beachley peninsula.
- Potential significant effect relating to the power transmission lines depending on their routing away from the barrage to reach the national grid.

#### Alternative Option L2: Welsh Grounds Lagoon

- Significant adverse effect on the landscape characteristics of the Gwent Levels Historic Landscape primarily related to the construction activity, new transport links and compounds required within this topographically flat and historically important landscape area.
- Significant adverse seascape effect with the loss of the estuarine pattern of sand, mud and rock being built over by the barrage, particularly at its upstream extents.
- Loss of the lower parts of the intertidal zone within the lagoon and resulting change to the existing visual character of saltmarsh and sandy banks along this extensive stretch of estuary shore.
- Foreshortening of views and change in seascape character as people look out onto the long stretch of the lagoon wall instead of the estuary and the detail of the opposite shore.
- Significant adverse effect to the dark night time characteristic of the Gwent Levels Historic Landscape and seascape that currently appears undeveloped at night.

#### Alternative Option L3d: Bridgwater Bay Lagoon

- Significant adverse effect on the landscape qualities at the northerly landfall where the lagoon wall would tie into the headland of Brean Down Scheduled Monument.
- Loss of the lower parts of the intertidal zone within the lagoon and resulting change to the existing appearance of Bridgwater Bay.
- Foreshortening of views and change in the appearance seascape as people look out onto the long stretch of the lagoon wall instead of the open estuary and the Welsh coast beyond.
- Secondary adverse visual effect from ancillary works associated with large construction compounds and new road infrastructure required to build the L3d Lagoon. This effect would occur at both ends of the lagoon wall and significantly alter existing landscape characteristics at its northern end around the Brean Beach area.
- A perceptual cutting off of Bridgwater Bay from the rest of the estuary in visual terms with the lagoon wall appearing artificial set out in the open water of the Bristol Channel.

#### *Assumptions, Limitations and Uncertainty*

This topic paper has assumed that sea-level rise will occur in line with the predictions of the Severn Estuary Flood Risk Management Strategy (SEFRMS). It has also assumed that in looking forward to future baseline conditions there is still an active approach to the management of tidal flooding rather than managed retreat or abandonment of sea defences.

With regard to limitations the study team has not been able to visit all coastal and landscape areas on and around the estuary due to its scale and the timeframe of the study period. The study team has however visited all identified seascape units and the landscape areas that lie behind them. They have limited inspection of landscapes to within 10km of the estuarine shore unless the desk study suggested extensive views of the estuary (usually from high ground) could be gained from over 10km away.



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*Measures to prevent, reduce and as fully as possible offset any significant adverse effects*

The measures identified to prevent or reduce likely significant adverse effects identified within this topic are summarised below in four categories Setting, Sizing, Styling and Secondary;

Setting

- Selecting of the preferred alternative option with regard to lessening its landscape and seascape effects.
- On choosing a preferred option then considering the individual fine grain of landscape and seascape characteristics of the route to best locate the landfalls, the temporary construction works, construction compound and power and transport infrastructure. This process would be best managed through consideration of the proposals in an Environmental Impact Assessment (EIA).
- Pay close consideration to the sensitive location of any land-base compounds and yards, temporary accommodation and the like to minimise the visual effect of these new facilities and to consider if existing assets could be utilised to prevent the construction of new ones.
- Implement locally appropriate structure planting and bunding around possible compounds and other onshore facilities planted in advance of any construction to maximise their visual screening effectiveness from the start of any works.
- Be responsive to the night-time appearance of the preferred alternative option and make it as appropriate as possible for its immediate setting and minimise light pollution.

Sizing

- Ensure that the minimum land and sea areas are taken for construction that would still allow safe and efficient construction and operation of the preferred alternative option.
- Keep the actual height of any structure whether it be the barrage or lagoon wall, lights upon it, control rooms or the shipping locks to a minimum to reduce its visual effect within the estuary particularly for distant views to the structure.
- Reduce the size of any new onshore compounds to reduce the scale of their potential adverse visual effect.
- Carefully consider the need for and location of any additional structures such as roadways or travelling cranes and hoists that would raise the apparent height of the preferred alternative option.

Styling

- Utilise good project and product design with regard to the visual appearance of any barrage or lagoon structure so that it has a visually attractive appearance rather than utilitarian or heavily engineered style. This approach is best demonstrated locally by the Severn bridges that combine effective engineering with appropriate aesthetics to create attractive structures.
- Where the preferred alternative option makes landfall more investment in that part of the structure is recommended to make it as fitting to the local scene as possible. However it should be noted that an attractive structure can still adversely affect the existing local landscape or seascape characteristics of an area due to its scale and perceived appropriateness within the setting.
- Continue appropriate aesthetics for the remainder of the barrage or lagoon wall that is further out to sea but focussed on the shape, material colour and reflectivity when viewed from afar.
- Consideration of the inclusion of visual variety within the structures including the creation of bays or promontories rather than a uniform wall with an unchanging form.
- Should it be deemed appropriate to allow public visitor access to the preferred alternative option then this should be done in an attractive and exciting way as it is likely to be a major visitor attraction.
- Ensure that any barrages or lagoons in the vicinity of the Severn Bridges complement the appearance of the existing structures rather than appear visually discordant with them.

## Secondary

- Sensitive route selection for power lines connecting any chosen alternative option to the national grid, ideally utilising where possible existing power transmission routes to reduce the need to form new transmission corridors.
- Careful alignment of power transmission lines leading away from any preferred alternative option to minimise their visual effect on the landscape area, its landscape features and how people view and experience the landscape and seascape areas..
- At particularly sensitive locations consider the undergrounding of transmission lines.
- In the post-construction phase retain only those facilities (whether they are onshore or offshore) that are truly required for the future safe operation of the barrage or lagoon.
- Prepare a post-construction remediation plan similar to that used in the reinstatement of large mining or industrial sites to ensure secondary areas are reinstated to meet pre-agreed objectives and the reinstatement creates an overall positive effect on Severn Estuary's wider landscape and seascape characteristics. This approach should prevent denuded land associated with the main construction area from being used for development and further altering the appearance of the landfall areas.
- Ensuring that any new recreational facilities or demands on the sea and coastal areas are sited sensitively away from tranquil areas and that they are subject to the full development control of local planning authorities.
- With regard to proposals to prevent or reduce likely significant effects by large scale habitat creation in the estuary then their landscape and seascape effects must be properly considered as well as their ecological effects.

Offsetting measures within this SEA are measures to as fully as possible offset any significant adverse effects on the environment. These measures therefore make good for loss or damage to an environmental receptor, without directly reducing that loss/damage. In this SEA 'compensation', a subset of offsetting, is only used in relation to those measures needed under the Habitats Directive. It is difficult to offset significant adverse effects on landscape and seascape areas as the characteristics of one place cannot be recreated elsewhere. However a broader Landscape Strategy could be implemented across the whole estuary to address the significant landscape and seascape effects identified by this SEA and any project focussed EIA work.

Offsetting can however be applied to land-use and how people use an area. For example if the preferred option leads to the closure of a park or a popular stretch of beach used for shore fishing this could be offset by opening up access to such facilities elsewhere. This topic paper recommends that possible offsetting measures to benefit landscape and seascape uses are considered in any EIA of the preferred alternative option.

## Assessment against SEA Objectives

This topic paper includes a full assessment of how each alternative option performs against each SEA Objective over the course of its entire life-cycle.

In summary:

The SEA Objectives summarised above refer to three objectives;

- Objective 1 - To conserve the character and qualities of the landscape/seascape, recognising its diverse features and distinctiveness at different scales – including designated and non-designated areas.
- Objective 2 - To conserve the character and qualities of physical and visual resource associated with land and sea.
- Objective 3 - To accord with the Aims and Articles of the European Landscape Convention

The compliance of each of the five alternative options with the three objectives are summarised in the table below;

Objective 1 - To conserve the character and qualities of the landscape/seascape.	Objective 2 - To conserve the character and qualities of visual resources.	Objective 3 - To accord with the Aims and Articles of the European Landscape Convention
<b>Alternative Option B3: Brean Down to Lavernock Point Barrage</b>		
<p>This largest of the three barrage options has the greatest adverse effect on landscape and seascape characteristics and qualities within the estuary. This is due to its linear size at 16km, its routing significantly affecting key estuary landmarks such as Brean Down, Steep Holm and Flat Holm and the largest loss of upstream intertidal habitat of all the alternative options.</p> <p>It would dramatically affect these landscape features and the wider characteristics of the estuary, The historic and cultural importance of Brean Down which is a Scheduled Monument would be affected. In perceptually terms the wildness of the estuary as a whole entity would be significantly reduced by placing a large barrier across its mouth. There is the potential for significant adverse effects from construction activity on shore as well.</p>	<p>Visually it is the most prominent of all the alternative options due to its linear size, the fact that it is viewed against or crossing open sea and the proximity of many vantage points out to this part of the estuary. Its presence within the visual scene would immediately change existing views of the estuary especially from places such as Brean Down and Lavernock Point where sight is gained along the whole length of the structure. The scale of visual change would diminish with increased distance away from the barrage.</p> <p>The B3 Barrage would also stop the Severn Bore from forming</p>	<p>Due to the significant adverse effects on landscape and especially the seascape elements of the upstream inter-tidal area it cannot be stated that this proposal protects landscapes in accordance with the ELC.</p>
<b>Alternative Option B4: Shoots Barrage</b>		
<p>This option has a significant adverse effect on both landscape and seascape characteristics within the immediate area and across the wider estuary.</p> <p>This consideration is made as the barrage is second largest in size and its construction would lead to significant adverse changes on the rural landscape qualities within the Gwent Levels Historic Landscape. Its landfall on the English side could actually be associated with existing development around Severn Beach and the nearby chemical works with less detrimental effects on the local landscape type. With regard to adverse seascape effects it would be constructed over the complex estuarine mosaic of channels, mud, sand and rock</p>	<p>Visually it is the loss of the estuary bed that would have the greatest visual effect. The variety of estuarine textures and diurnal change in the estuary's appearance would be lost from Shoots Barrage up through the Upper Severn Estuary. However visually it could be associated with the presence of the Second Severn Crossing reducing the effects of its visual intrusion in the area. The likelihood of visual intrusion of working area in the historically important Gwent Levels must also be recognised due primarily to the contrast with the existing rural landscape characteristics and agricultural land-use near to the proposed landfall and also due to its flat topography.</p>	<p>As per B3 this option does not accord with the ELC's objective of protection of landscape character with the significant loss of the low tide seascape elements of the Upper Severn Estuary</p>

Objective 1 - To conserve the character and qualities of the landscape/seascape.	Objective 2 - To conserve the character and qualities of visual resources.	Objective 3 - To accord with the Aims and Articles of the European Landscape Convention
<p>resulting in its permanent loss. Compounded with this is the resulting loss of similar intertidal habitat upstream of the barrage adversely affecting the seascape elements of The Shoots and Upper Severn Estuary significantly.</p>	<p>The B4 Barrage would also stop the Severn Bore from forming.</p>	
<p><b>Alternative Option B5: Beachley Barrage</b></p>		
<p>Landscape effects are the least of all alternative options as the site is a small contained area leading between the Beachley peninsula and the land near to the existing motorway services. Building compounds on either side of the estuary would reduce immediate landscape qualities with the southern bank having the greater capacity to accommodate such development around the existing motorway services.</p> <p>With regard to seascape effects there is the construction over the estuarine rock, mud and sand combined with the loss of sight to the lower part of the intertidal area upstream of the barrage. This includes the considerable sandbanks of the Upper Severn Estuary.</p>	<p>Considering visual quality it would be associated with the original Severn Bridge. The narrow point of estuary and resulting shorter length means the barrage would not be as prominent in the overall estuary as the other barrage options. It's proposed position although publically accessible for both banks does not have a high number of visual receptors to look onto the barrage and is visually constrained with high ground on the south bank and a relatively low number of users at the end of Beachley peninsula.</p> <p>Like the other barrage options B5 prevents the Severn Bore from forming.</p>	<p>As per B3 this option does not accord with the ELC's objective of protection of landscape character due to the reduction of intertidal areas in the Upper Severn Estuary.</p>
<p><b>Alternative Option L2: Welsh Grounds Lagoon</b></p>		
<p>This alternative option would have a significant adverse effect on landscape and seascape elements locally to the construction area and within the lagoon formed by the construction of wall.</p> <p>In landscape terms the Welsh Grounds area is perhaps the one with the least landscape qualities of all those receiving or being affected by these alternative options. This flat area of predominately agricultural land has dispersed settlement and little visual variety, especially when looking along the straight, uniform coastline. However this lack of</p>	<p>Visual effects and close up views to the proposed L2 lagoon would be comparatively limited given it is the longest of all the alternative options at 28km long. The lack of major development close to the shore in this area means there is a low number of people using the area, this in turn actually contributes to its sense of tranquillity.</p> <p>The L2 route is however looked upon by large numbers of visual receptors from the English side of the estuary from Clevedon all the way up to Severn</p>	<p>Lagoon option L2 does not accord with the ELC's objective of protection of landscape character due to the loss of the intrinsic landscape characteristics of the Welsh Grounds saltmarsh.</p>

<b>Objective 1 - To conserve the character and qualities of the landscape/seascape.</b>	<b>Objective 2 - To conserve the character and qualities of visual resources.</b>	<b>Objective 3 - To accord with the Aims and Articles of the European Landscape Convention</b>
<p>obvious features belies its historical importance as an area demonstrating long-term historic settlement. The Gwent Levels are afforded the designation of Historic Landscape of Outstanding Historic Interest in Wales. Any development within this area for secondary activities such as road links or construction compounds would have a significant adverse effect on its existing rural landscape characteristics and its historic landscape qualities.</p> <p>As for seascapes the coast is a low-lying one made up of sandy intertidal ground and saltmarsh. This saltmarsh area appears open and extensive and undeveloped even though the greater extent of the coast is protected by sea defences. These extensive views would be lost along with the existing saltmarsh as this alternative option would inundate the area for longer and remove the greater part of the inter-tidal habitat.</p> <p>The combination of these to changes landscape and seascape characteristics would reduce the area's current sense of relative tranquillity.</p>	<p>Beach. However the views from these places would not be close-up or distinct with the lagoon wall set against the existing backdrop of landform.</p> <p>Its construction would still allow the Severn Bore to form.</p>	
<b>Alternative Option L3d: Bridgwater Bay Lagoon</b>		
<p>This alternative option leads to significant adverse landscape effect but does not lead to significant seascape effects as the majority of the tidal range within Bridgwater Bay is retained.</p> <p>The adverse landscape effect primarily relates to its landfall at Brean Down Scheduled Monument and the reduction of its presence as an important landscape feature.</p> <p>There would also be adverse landscape effects at</p>	<p>Visually the barrage would be particularly prominent from Brean Down and other high ground including the western end of the Quantocks and Brent Knoll. From the shore settlements such as Burnham-on-Sea, Berrow and Brean would all have their views out to sea curtailed by the presence of the lagoon wall. Perceptually the curve of the lagoon wall, especially when looked upon from high ground would isolate Bridgwater Bay from the rest of the estuary.</p> <p>Its construction would however still allow the Severn</p>	<p>Options L3d is considered to accord with the ELC's objective of protection of landscape character by maintaining the greater part of the intertidal area which is one of the intrinsic characteristics of Bridgwater Bay. However it should be noted the introduction of the lagoon wall could be considered not in accord with the ELC.</p>



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<p>the other landfall near Stolford and Hinkley Point but the landscape in that vicinity has a greater capacity for the structure given the existing development of the nuclear power station and associated power transmission lines. Secondary landscape effects would be caused by the onshore construction areas.</p> <p>This alternative option would generate power on both the ebb and flood tide. This means that there is less effect on the characteristic inter-tidal area of the bay behind the lagoon wall. Mudflats would still be exposed at low-tide and saltmarsh would still be able to survive at the top of the tidal range.</p>	Bore to form	

## Plan Implementation

### *Legislation and policy compliance*

This paper contains a review of legislation and policy that is specifically relevant to this topic. An assessment has been made as to whether each alternative option would be compliant with existing relevant legislation and policy.

Working from a global basis to a national and regional level the following legislation has been considered.

- World Heritage Site. There are none affected by these proposals the nearest being the industrial landscape of Blaenavon.
- At a European level the European Landscape Convention (ELC) was signed by the UK government on 24 February 2006, ratified on the 21 November 2006, and became binding on 1 March 2007. Its aims are considerable as it promotes the protection, management and planning of European landscapes.
- The barrage alternative options would have a significant, adverse effect on the landscape as would the L2 Welsh Grounds lagoon option.
- Four out of the five alternative options are considered not to accord with the protection of landscape aim of the ELC due to their significant adverse effect on inter-tidal areas within the estuary.
- The fifth option L3d – Bridgwater Bay Lagoon is considered to not have a significant negative effect on inter-tidal areas due to the ebb-flood turbines keeping the greater part of Bridgwater Bay visible at low tide. As a structure L3d – Bridgwater Bay Lagoon still has a range of adverse landscape and seascape effects including the change in landscape characteristics at Brean Down Scheduled Monument and the visual effects of the lagoon wall truncating views out to sea.
- All the alternative options partly comply with the ELC by engaging stakeholders in actively analysing and planning for landscape change.

Legislation as it relates to landscape is typically enshrined within planning statute and policy. Seascape also falls under planning statute but has considerably less policy guidance to shape its future development and management. The following Planning Policy Guideline (PPG) and Planning Policy Statements (PPS) are considered to be most applicable to guiding the development of any of the alternative options;

- Planning Policy Wales, March 2002
- TAN14: Coastal Planning (Welsh Assembly Government, 1998)
- PPS 7 – Sustainable Development in Rural Areas
- PPS 15 – Planning and the Historic Environment
- PPG 20 – Coastal Planning
- PPS 22 – Renewable Energy

The designation of landscape and coastal stretches by statute affords extra protection in SEA terms to areas with national designations for high scenic quality or historic importance. This does not mean that other non-designated areas are not important for their landscape and seascape qualities or to visual receptors using or viewing these locations.

At a national level the most significant designations are;

- National Park (NP) – Exmoor is the sole example in proximity to the Severn Estuary and the Bristol Channel whilst the Brecon Beacons have some distant views to the estuary from its southern extremities.

- Area of Outstanding Natural Beauty (AONB) – the Quantock Hills and Mendip Hills positioned on the southern side of the estuary with the Wye Valley as the sole AONB in proximity to the northern side of the estuary. Distant visual relationships lie with the Cotswolds AONB.
- Heritage Coast (HC) – Exmoor Heritage Coast and Glamorgan Heritage Coasts both lie to the west of all the alternative options with distant visual links back to Options B3 Barrage and L3d Lagoon.
- Landscape of Outstanding Historic Interest in Wales (LOHIW) – Gwent Levels Historic Landscape is the only such registered landscape in the study area.
- Scheduled Monument (SM) – designated sites with valuable historic and cultural associations including Brean Down, Worlebury Hill Fort and Norton Hill Fort

Of these areas the Gwent Levels Historic Landscape could be affected by two of the alternative options. Both B4 – Shoots Barrage and L2 – Welsh Grounds Lagoon would encroach with construction activity affecting the area’s historic and cultural landscape associations. Brean Down SM would also be potentially affected by two of the alternative options - B3 Brean to Lavernock Barrage and L3d Bridgwater Bay Lagoon.

Local Planning Authorities now consider all landscapes as important in-line with the ELC. National Character Areas (NCA’s) have been formed to give definition to regional landscape character in England. It is then the duty of the Local Planning Authority to define the next level of landscape characterisation in their area. Whilst in Wales CCW working in conjunction with the Welsh Local Planning Authorities have formulated LANDMAP. This is a single rather than two stage study that has systematically mapped landscape character (and other environmental topics) to a ‘fine grain’ at authority level across the whole principality. These landscape characterisation documents do not in themselves restrict development but offer guidance to planners and developers as to what in landscape terms is considered important for an area and what capacity the landscape may have for certain types of development. It is then up to the development control authorities to use these documents to help them determine if a development should be granted consent.

All the alternative options would adversely affect the landscape qualities described in these landscape characterisation studies and change the landscape and seascape characteristics of the various NCA’s permanently.

#### *Monitoring of significant environmental effects*

The SEA Directive requires that monitoring measures are described within the environmental reporting. The monitoring proposals contained within this paper are applicable to all of the alternative options under consideration.

The monitoring of significant environmental effects would not relate to the direct landscape and seascape effects of the preferred alternative option as they would be fully apparent on construction. Secondary effects particularly with regard to the appearance of seascape areas would require monitoring. This would include:

- Extent of saltmarsh and success of any measures to prevent, reduce and as fully as possible offset any significant adverse effects of saltmarsh erosion. Level of success for specific site related measures to prevent or reduce adverse effects for the preferred alternative option as defined at EIA stage.
- Monitoring of erosion elsewhere in the estuary caused by longer periods of higher standing water.
- Monitoring of important landscape characteristics and visual effects from the some of the viewpoints identified in this study.
- Such monitoring should consider any river corridors experiencing an impoundment effect.
- Conducting an update to Landscape Character Assessments at a regional and local scale.
- Assessing the change to the sense of tranquillity around the estuary.



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- Considering the success of advanced screening works to mitigate the visual effect of construction areas.
  - Assessment of the success of landscape remediation of construction areas on completion of the chosen alternative option.
  - Monitoring of the night-time illumination of any chosen alternative option and modification to it should these be necessary.
  - Ensuring that associated building form and the appearance of secondary areas is acceptable within the local scene and designed to a high quality.
  - Monitoring of any tourism pressures as they relate to people visiting any chosen alternative option and responding to any conflicts of interest or difficulties increased visitor numbers may bring.
  - Assessing the secondary development of increased recreational usage of higher, impounded water and ensuring that such development is conducted to a structured plan that protects the most sensitive and cherished areas within the estuary.
  - Conducting as recommended in the European Landscape Convention the production of a Landscape Strategy to guide landscape change during and post development. Any such Landscape Strategy would have to be agreed by appropriate government departments working in conjunction with local authorities to deliver the wider Landscape Strategy for the estuary.

