

CHAPTER 7: VISUAL ENVIRONMENT

7.1 Assessment of Existing Landscape and Seascape

7.1.1 Introduction and Purpose of Seascape Assessment

This chapter is a brief summary of the detailed appraisal of seascape and visual issues relating to the proposed wind farm at Burbo Offshore, to which full reference should be made in Technical Appendix No G in Volume 4. This is accompanied by the full set of 31 seascape figures in volume 3. Detailed consideration is also given in this technical report to mitigation measures, the grid connection and onshore infrastructure, and evaluation of cumulative issues, all of which are only briefly covered in this chapter.

The seascape assessment has been carried out in three main stages. Firstly, best practice guidelines were used to carry out a detailed baseline characterisation of seascapes within a 30km radius of the site, resulting in a mapping process whereby areas of common character were described, classified and mapped as distinct 'seascape units'. This was carried out on both a national and a regional scale, as described below. Secondly, the capacity of each of these seascape units to accommodate change was evaluated, and this in turn was followed by an appraisal of the likely visual impacts of the wind farm on certain viewpoints and seascapes.

The location of the wind farm is shown in Volume 3, Figures 1 and 2. The wind farm itself will comprise 30 turbines, with the towers standing a maximum of 85m above the seabed and the turbines sweeping a 90m diameter.

7.1.2 Seascape Characterisation – National Seascape Units

The proposed location of the Burbo Offshore Wind Farm falls precisely on the dividing line between two National Seascape Units, as illustrated on Volume 3, Figure 3. Such units are defined as "extensive sections of the coast with an overriding defining characteristic such as coastal orientation or landform defined by major headlands of national significance".

7.1.3 National Seascape Unit: Great Orme to Mersey Estuary

This National Seascape Unit is some 60km long, incorporating a broadly north-facing coastline from the Great Orme to the Mersey. The extent of the study area, however, limits this appraisal to the 30km limit of the ZVI from the Vale of Clwyd to the Mersey Estuary, and this is hereafter referred to as the Vale of Clwyd to Mersey Estuary National Seascape Area.

7.1.3.1 Coastal Component

This section of coast faces north-north-west and is divided in two by the Dee Estuary. The characteristics of the coast are its wide sandy beaches with a high tidal range, drying out as the tide recedes, and a developed coastal plain. This varies from less than a kilometre below the lower slopes of the northern and eastern Clwydian Range, featuring caravan parks, links golf courses and industrial development next to the road and rail corridor, to the flat landscape of northern Wirral which is dominated by sprawling residential communities.

The headland promontories at Point of Ayr, Hilbre Island and Perch Rock form the boundary points for the four regional seascapes, namely Clwydian Hills, Western Dee, Eastern Dee and North Wirral (see Technical Appendix G). Good 180 degree views exist out to sea from coastal viewing points and from the path along the North Wirral Country Park, with views of the Douglas and Hamilton oil rigs on clear days.

7.1.3.2 Landward Component

The rising landform of the Clwydian Range forms the dominant backdrop to the whole seascape of this part of north-east Wales, the ridgeline crest running south from Prestatyn effectively cutting off all sea views from outlying areas. Views from above Prestatyn are directed out north-west by the presence of Bryn-llwyn. Views from the hills above the A548 are focused on the attractive landscape of north Wirral, with only one or two smaller villages having open views northwards over Liverpool Bay.

Two wooded sandstone ridgelines down each side of the Wirral define its landform profile. These run south from Grange Hill through Caldy Hill, Thurstaston Hill and Heswall; and from Bidston Hill through Noctorum to Storeton. Extensive development on the Wirral has limited significant northern sea views to the war memorial at Grange Hill, the frontage at Hoylake and Kings Parade promenade at New Brighton.

7.1.3.3 Marine Component

This region is characterised by a high level of recreational activity, ranging from various sailing clubs using off-shore waters for racing and pleasure-yachting to the dedicated use of marine lakes, for example windsurfing at West Kirby and jet-skiing at New Brighton. Sea views include ferries and commercial vessels at most times of the day, accessing the docks of Liverpool and Birkenhead on the Mersey, and to a lesser extent Mostyn Quay and the Manchester Ship Canal on the Dee.

7.1.3.4 History and Development

The development of the region hinged on the expanding rail and ferry network around the coasts of North Wales and the Wirral. This

immediately opened up the potential for developing the coastal resort towns of New Brighton, West Kirby, Prestatyn and Rhyl, and industrial development along the western Dee. (These towns are now sadly in decline, although plans for regeneration are now progressing to try and revive their fortunes).

Meanwhile the towns of, for example, Heswall and Hoylake, continued to expand as settlements for wealthy commuters and the retired (with associated links golf courses), and post-war residential development has continued, in particular within north central Wirral.

7.1.4 National Seascape Unit: Mersey Estuary to Fleetwood

This National Seascape Unit is also some 60km long, incorporating a broadly west-facing coastline from the Mersey to the start of Morecambe Bay. The extent of the study area, however, limits this appraisal to the 30km limit of the ZVI from the Mersey Estuary to the Ribble Estuary, and this is hereafter referred to as the Mersey Estuary to Ribble Estuary National Seascape Area.

7.1.4.1 Coastal Component

The coastal component along Liverpool's waterfront is characterised by the landmark buildings of the Pier Head and an extensive dock system extending up to the Royal Seaforth Dock and the recent wind farm on the Seaforth waterfront.

From Seaforth, the coastal character immediately changes. The Sefton Coastal Footpath extends all the way up to Southport, backed by a man-made embankment up to Crosby and at Hightown, and elsewhere by a virtually continuous dune system, with extensive pine plantations along the Formby coastline. These embankments, dunes and woodlands define the edge of the seascape for much of this length, although limited views of the sea are gained from first floor windows at Waterloo, Crosby, Blundellsands and Hightown. Formby Point divides this stretch of seascape into two regional seascape units, namely North and South Sefton, with the Mersey being classified as a separate unit.

Wide sandy beaches are also a feature of this coastline, although access is restricted at certain points due to either unsafe beach conditions or the exclusion zone in front of the rifle ranges north of Hightown. Public viewpoints towards the proposed development are gained from the car park at Crosby Coast Guard Station, from short walks from the car parks at Formby Point and Freshfield Red Squirrel Reserve, and from the end of Southport Pier.

7.1.4.2 Landward Component

This is appraised in three sections. Firstly, in north and central Liverpool, the landform starts rising immediately behind the main A5036 dock road,

the most notable hills being Parliament Street (location of Anglican Cathedral), Mount Pleasant (location of Metropolitan Cathedral) and at Everton Park. A ridgeline continues north up to Walton and south through Edge Hill to Princes Park, creating a visual cut-off to outlying eastern areas. The dense cityscape to the west of this ridge effectively restricts potential views to the Mersey with the exception of occasional higher buildings. Everton Park provides the only significant ground level viewing point over the city and across to the mouth of the Mersey.

The second landward component of this seascape is defined by the continuous residential frontage from Waterloo to Crosby Coast Guard Station, but as already mentioned, views are restricted by the seafront embankment to the higher storey windows of the colourful Georgian properties at Waterloo and the newer frontages of north Blundellsands.

Thirdly, the landform component north of Crosby is mostly cut off by the townships of Hightown, Formby, Ainsdale and Southport, together with frequent intervening woodlands. This is a very flat landscape extending over the floodplain of the River Alt, and views to the sea are only regained once the landform starts rising again, with viewpoints at Clieves Hill west of Ormskirk (12km from the coast), and Billinge Hill, Ashurst's Beacon and Parbold Hill (all at least 22km from the coastline).

7.1.4.3 Marine Component

Marine activity off this coastal unit is the busiest in the north-west of England, with international ferries and commercial vessels sailing eastwards towards Hightown and then cutting south-east through the Crosby Channel towards the docks of Liverpool, Birkenhead and Garston, and the Manchester Ship Canal at Eastham.

Liverpool is a favourite destination for cruise liners, with entry to the Mersey framed by the recent Seaforth wind farm and Fort Perch Rock, docking opposite the world famous Pier Head buildings. Local frequent ferry crossings also occur across the Mersey. Added to this are fishing vessels trading in Liverpool Bay and yachts and pleasure craft operating out of Brunswick Dock.

7.1.4.4 History, Development and Attributes

The development of the region has been inherently tied to the growth of Liverpool as a port handling goods from around the world. Rapid growth occurred at the turn of the century as the industrial revolution continued and immigrant workers swelled the local population. Land was reclaimed to achieve a continuous dock system down a 9km stretch on Liverpool's waterfront, and successive bands of house building continued to increase the footprint and population of the city.

Many docks fell into decline in the 1970's and 80's, and some of the city's fortunes with them. However the Freeport is now rapidly expanding and

the last decade has witnessed ongoing urban regeneration, industrial diversification and continuing house building, demonstrating a renewed confidence for the future.

7.1.5 Seascape Characterisation – Regional Seascape Units

Having described the main attributes of the two national seascape areas, assessment was then made of these seascapes at a regional level, and full descriptions of the seven regional seascape units are given in the technical report, together with comment on the relative sensitivity of the main receptor groups, namely residents, those seeking views, walkers and cyclists, resort users, and the travelling public.

7.2 Evaluation of Environmental Effects on Seascape

7.2.1 Initial Impact Reduction

The design and location of the proposed wind farm has been an ongoing iterative process taking many factors into account, not least of which has been the perceived visual impacts by the closest receptor groups, namely those living on the Crosby and North Wirral coasts.

Well attended public consultation meetings were held at Fort Perch Rock and Crosby Coast Guard Station on 19th and 25th May 2002, and with particular regard to the sensitivities of groups living on the Crosby waterfront, the proposed wind farm geometry was reconfigured by relocating a number of turbines from the southern extent to the western edge, in other words further away from the Crosby coast.

This forms a more compact layout which significantly reduces the field of view of the turbines from the Crosby coastline, and in particular it reduces and in many cases removes potential turbines which would otherwise be seen in silhouette at sunset. A further advantage is that, with the leading array of turbines receding at approximately 45 degrees from the viewer over a distance of 4km, the wind farm would appear to feather down and merge with the horizon.

Consideration has also been given to residents and visitors on the North Wirral coastline, who also benefit from this reconfiguration. This is primarily due to the fact that the nearest turbines would be 2km further away from the shore than they were before and that from many viewing points, this 'feathering effect' would also be apparent. The field of view of the wind farm is no worse than the earlier scheme since part of the fourth line of turbines on the western edge existed on the previous layout.

7.2.2 *Evaluating 'Quality', 'Value' and 'Capacity to Accommodate Change'*

Reference should be made to the technical report for a full description of these evaluation criteria. In principle, a number of consistent considerations are applied to each seascape unit in order to achieve as objective an evaluation as possible.

Quality in seascape reflects the condition of the components or features of which it is comprised. The relative degree of importance attached to a seascape type, area or feature constitutes its value. This is somewhat harder than quality to define objectively, therefore subjectivity is limited by using explicit, previously agreed criteria. The capacity to accommodate change is defined as 'the ability and degree to which a seascape character area or type can accommodate change without unacceptably reducing quality or value'.

7.2.3 *Evaluation of National Seascape: Vale of Clwyd to Mersey Estuary*

This National Seascape Area comprises four Regional Seascape Units, namely Clwydian Hills, Western Dee, Eastern Dee and North Wirral. These are evaluated on tables 3 to 6 in Appendix 1 of Volume 4, Technical Appendix G for the sake of comparison and clarity, and are then combined on Table 1, Appendix 1.

The Regional Seascape Unit evaluation tables (see Technical Appendix G) should be referred to whenever possible in assessing the capacity of seascapes to accommodate change and appraising the likely impacts of development. However the following summary of this National Seascape Unit gives a useful overview, again given the above qualifications.

7.2.3.1 Physical Form

The combination of developed coastal strip and coastal plain, together with the nature of the rising landform and plateau which define the viewshed, and the fact that most views of any wind farm would be front-lit by the sun, suggest a moderate to high capacity to accommodate an offshore wind farm in all areas apart from the Eastern Dee Estuary, which is judged to have a low capacity.

7.2.3.2 Quality

The highest value of the seascape is the popularity and accessibility of its seaside resorts and the rich provision of recreational and leisure opportunities. Otherwise, since the seascape type is widespread, is not natural or remote, and is considerably fragmented and despoiled, its overall value is considered to be low. The only components which are of special value are the Clwydian Range AONB and the Dee Estuary. Their value would not be compromised, however, since significant panoramic viewpoints from the former are directed to the north-west and are shielded

from the proposed development, and views to and from the Wirral across the Dee would not be directed towards the wind farm.

7.2.3.4 Receptors

There are only small numbers of highly sensitive residents in the study area, most others being either screened or at distance from the proposed development. Most of the significant viewpoints in the area are in the context of a built environment, and those in more natural locations such as Thurstaston Common are focused away from the development. There is one sensitive coastal path in North Wirral but in the context of a hard coastal defence construction. The proposed development would not be significant in terms of the purpose of use by resort and water sport recreational users, nor by those using private or public transport.

It has therefore been shown that this national seascape area has a moderate and in some cases moderate-to-high capacity to accommodate the proposed offshore wind farm in terms of its receptor groups.

7.2.4 Evaluation of National Seascape: Mersey to Ribble Estuary

This National Seascape Area comprises three Regional Seascape Units, namely the Mersey Estuary, Crosby (South Sefton) and North Sefton. These are evaluated on tables 7 to 9 in Appendix 1 of Volume 4, Technical Appendix G for the sake of comparison and clarity, and are then combined on Table 2, Appendix 1.

7.2.4.1 Physical Form

This is also a fairly straight coastline, but with a westward-facing aspect. An extensive coastal plain runs inland for approximately 10km to the Leeds and Liverpool Canal, from where it starts gently rising eastwards towards the higher points of Merseyside and Lancashire some 27 to 30km distant .

Apart from the flat dockland strip, Liverpool is built on similarly on rising ground. The plateau above Everton Park cuts off all views further inland, as clearly demonstrated on the ZVI's, but continuous development up the slope and on the plateau effectively screens views from almost all these areas as well, with the exception of Everton Park.

The combination of these factors clearly demonstrates a fairly high capacity of the national seascape to accommodate an offshore wind farm, although parts of the South Sefton seascape have a lesser capacity due to the coastline aspect facing the proposed development and its shape being fairly straight. Reference should be made, however, to the sensitivities of user groups along this coastline, as described below.

7.2.4.2 Quality

This national seascape remains largely intact, has a clarity of land use and pattern, is generally in a well-maintained condition, does not suffer too many detractors and is moderately fragile. Its overall quality is therefore judged to be moderate to high.

7.2.4.3 Value

The highest value of this seascape is the popularity of the coastal zone for leisure, recreation and amenity, even though accessibility is not easy in many parts. Several important landscape and nature designations are in place, which is due in part to a regional distinctiveness of both the natural and built elements within it, creating a strong sense of place in several areas. Nowhere has a national value of remoteness or tranquillity, but several parts of the less accessible beaches and dune systems along what is a fairly natural coastline could be said to be regionally remote and tranquil. The area also has much stronger historic and cultural associations than the previous seascape. Due to all these factors, the overall value of this seascape is therefore considered to be of moderate-to-high value.

7.2.4.4 Receptors

Considering the huge population of the region, there are a surprisingly small number of highly sensitive residential receptors, namely those properties along the Waterloo and Blundellsands waterfronts and at the ends of some cul-de-sacs in Hightown, all of which have first floor windows affording views out to the proposed development (but significantly not ground floor and garden views). Over half the important viewpoints in the region are either in a built environment or adjacent large extensive car parks. Clieves Hill is in a rural context but at distance and with views of the Seaforth Wind Farm. Formby Point is the most sensitive viewpoint, again in a natural setting, but potential views of an offshore wind farm would not be entirely out of keeping with the gas rigs and the almost constant marine activity on the sea horizon.

Sefton Coastal Footpath is the only footpath with views westwards to the proposed wind farm, but these are within an engineered context along the Crosby section (with clear views of the fairly close Seaforth Wind Farm to the south) and within a dune context up towards Hightown, with the same marine structures and traffic as above. The proposed development would not be significant in terms of the purpose of use by resort and water sport recreational users, nor by those using land-based private or public transport. Those on board ferries and cruise liners would have the greatest awareness of the proposed structures of any public group, but these are considered to be of added interest rather than detracting from the marine seascape.

It has therefore been shown that this national seascape area has a generally moderate-to-high capacity to accommodate the proposed offshore wind farm in terms of its receptor groups, with the proposed wind farm location already having been adjusted to take into account the sensitivities of key receptor groups on the Crosby coast.

7.2.5 Evaluation of Regional Seascape Units

These are presented in a tabulated format (refer tables 3 to 9 within Appendix 1 of Volume 4, Technical Appendix G) to enable clear comparison between the seven different regional seascapes. These tables were drawn up prior to the national seascape area tables 1 and 2, and a format was developed during and following field visits to classify each characteristic of 'seascape quality', 'value' and 'capacity to accommodate change' between two opposite extremes.

This classification system should not be used as a definitive evaluation of seascape character since it can obscure local distinctiveness, but it serves as a useful guide, together with the notes, to help construct an overall assessment, from which clear comparisons can be made. It is strongly recommended that these are used for meaningful appraisal.

7.3 Appraisal of Predicted Visual Impacts of Development

7.3.1 General Notes on Visual Impact

The appraisal is preceded by some brief notes on visual effects in order to clarify any comments made elsewhere in the document on seascape evaluation and visual impacts of the proposed development.

7.3.1.1 Acuity of the Human Eye

As referred to in the GSA guidelines, theoretical visibility (as illustrated on the ZVI's) is reduced by the limits of the human eye. Parts of the turbines would therefore be at the limits of visibility at distances of 20km in most conditions, and beyond 30km the entire structure, although still theoretically visible, would not be noticeable to the human eye.

7.3.1.2 Weather Conditions

Even within a 20km radius around the proposed wind farm, mist, haze, precipitation and other atmospheric conditions will further exacerbate the difficulty of seeing the turbines. On average, a quarter of potential viewing days will be lost to these weather conditions on the nearest coasts, and reference should be made to the table in Volume 4, Technical Appendix G, Appendix 2 for more detailed information. At a distance of 16km, this figure rises to 75% (eg at Point of Ayr), and at 20km, eg on the Halkyn Range, 80% viewing days will be lost.

7.3.1.3 Aspect and Time of Day

From the North Wales, Deeside, North Wirral and Mersey coastlines, views are all northwards, changing from north-east to north-west respectively. From these locations, the turbines will mostly be front-lit by the sun, and as such the light grey colour of the turbines will be cast even lighter, rendering the turbines even less prominent.

North of Crosby, views change to a westerly aspect, and turbines will gradually change to being rear-lit during the evening in clear conditions. From the headland at Formby Point, the whole wind farm would intervene in potential sunset views, but sensitivity would be lessened by the fact that many would have returned home before this stage of the day.

7.3.1.4 Elevation of Viewpoint and Tidal Conditions

Most of the significant viewpoints are along the coast at elevations around 10m AOD. From these positions, the proposed wind farm would appear on the seascape horizon, with no sea behind the turbines. When viewed from higher elevations such as the northern hills of the Clwydian Range, the turbines would mostly appear below the sea horizon, with further masking by rising landform in the background.

The difference in sea level (tidal range of 4.5 and 8.5m for spring and neap tides) would not be noticeable from these elevations, but would have a minor bearing on the coastline views at differing tidal conditions.

7.3.1.5 Visual Impacts during Construction and Decommissioning

The visual impacts of the wind farm arrays will gradually build up or diminish as each phase progresses, but the duration of each phase would be restricted to a few months each. Otherwise the principal visual impacts would be increased shipping activity around the site, although mainly to and from the Mersey Estuary.

7.3.1.6 Visual Impacts at Night

Two types of lighting will be provided on the turbines, aviation and navigation lighting. The former would be constantly activated for all turbines but would only be visible to aircraft approaching John Lennon Airport, not from coastal viewpoints.

Navigation lighting for the proposed wind farm would be required to directly comply with Trinity House regulations. These lights would be column-mounted and directed down to the sea surface to provide visibility up to 5 nautical miles, in other words just visible from the closest land masses in conditions of good air quality, but too faint to create any night glow, and in any case less distinct than the flashing red and green marker buoy lights delineating the Crosby Channel.

Further comment on value judgements, aesthetic perception and context of view are also addressed in Volume 4, Technical Appendix G.

7.3.2 Appraisal of Zones of Visual Influence

7.3.2.1 General Comments

A number of 'Zone of Visual Influence' maps (ZVI's) are included as Figures 12 to 16 to assist in predicting the theoretical extent to which the proposed offshore wind farm(s) would be visible. The most important use of this computer model is in taking account of all existing landforms which obscure areas of land from all view of the proposed wind farm, known as 'dead ground' and which is left uncoloured on all plans. This is most clearly shown by the ridgelines through central Liverpool and across the Clwydian Range which completely cut off views behind.

However, the *fundamental weakness* of this modelling system is that it takes no account of intervening built form or vegetation, both of which would have a very high 'cut-off' capacity in obstructing views of the wind farm from outlying landscape or cityscape; in other cases reducing visibility to only the tips or upper sections of the turbine blades.

The first three ZVI's do, however, show a helpful split between areas of sea and land where no turbines would be visible (shown uncoloured), 1 to 7 would be visible (green), 8 to 15 (blue), 16 to 22 (red) or all 30 (yellow). To summarise, the ZVI's must not be read as a definitive figures in their own right, rather as tools to predict areas which will not have views of the proposed wind farm because of topographic screening.

7.3.2.2 Pattern of Visibility

Given the above comments, the general pattern of true visibility of the proposed wind farm, taking into account intervening built form, structures, woodland and vegetative screening, would be as follows:

- unobstructed views from out at sea (gradually reducing with distance until theoretically they would eventually disappear due to the curvature of the earth)
- extensive open views from beaches, sea walls and the top of dunes, and occasionally from further in land where there are no elevated coastal defences or walkways
- obstructed views from the coastal strip immediately behind the coastal, due to intervening elevated sea defences, walkways, estuarine levees, and in some cases the railway.
- Obstructed views from inland settlements due to built-up coastal frontages and caravan parks, with open sea views only from isolated properties and residential areas, even within Liverpool
- Obstructed views from inland landscape areas due to intervening built form, woodland blocks and hedgerows, for instance over the coastal plain running inland from Crosby, Hightown and Formby

- Small pockets of views on undulating, treeless hillsides which rise above and away from the coastal plain, for instance Grange Hill and the lower east-facing slopes of the Clwydian Range
- Occasional panoramic views from more steeply rising slopes where there are no intervening features, for instance on the scarp slopes of Everton Park and the northern Clwydian Range
- Occasional panoramic viewpoints from elevated outlying areas such as Clieves Hill south-west of Ormskirk, and then Billinge Hill, Ashurst's Beacon and Parbold Hill, all some 30km distant

7.3.3 Appraisal of Visual Impacts of Similar Developments

Seaforth Wind Farm comprises six Vestas V44 wind turbines over a length of 1.2km along the Seaforth waterfront at the mouth of the River Mersey in front of Seaforth Dock. This has been appraised in detail to illustrate the visual impacts of an existing wind farm, taking into account factors of relative scale and distance, which were then applied to the proposed Burbo Offshore wind farm.

7.3.4 Methodology and Rendering of Photomontages

7.3.4.1 Methodology in Preparing Photomontages

A correct methodology is critical in ensuring that the photomontages are constructed to yield a final image which gives the viewer an accurate impression of the scale of the wind farm from different locations. This is set out in Appendix 4 of the Technical Appendix. The rendering of the turbines is equally important. Two montages are included to show turbines in natural lighting conditions, but others are given a darker rendering simply to enable the turbines to be viewed on the montages.

7.3.5 Effects on Views from Photomontage Viewpoints

7.3.5.1 Summary Assessment of Visual Impacts

These effects are fully described in Volume 4, Technical Appendix G, but are summarised on the following table.

Table 7.1 Predicted change and impacts of wind farm

No	Location	Sensitivity to change	Magnitude of change	Predicted impact
1	Prestatyn Nova Centre	Low	Very low	Negligible
2	Point of Ayr viewing platform	High	Low	Slight
3	Hilbre Island	High	Moderate	Moderate to high
4	Thurstaston Common	High	Low	Negligible
5	Leasowe Slipway	Moderate	High	Moderate
6	Fort Perch Rock, New Brighton	Moderate	High	Moderate
7	Everton Park circular car park	Moderate	Low	Slight
8	Seaforth flyover, north bound	Low	Low	Negligible

9	Crosby Marina coast access pt	Moderate	High	Moderate to high
10	Crosby Coastguard Station	Moderate	High	Moderate to high
11	Formby Point	High	High	High * see 7.3.5.10
12	Southport Pier	Moderate to high	Very low	Slight
13	Clieves Hill	Moderate to high	Low	Slight
14	Anglican Cathedral	Moderate to high	Low	Slight
15	Footbridge over A55, Holywell	Low	Low	Negligible
16	St Elmo's Summer House	Moderate to high	Very low	Slight

7.3.5.2 Explanation of Terminology

“Predicted impact”. In predicting the likely visual impacts of the development (i.e. comparing how the existing view will change due to the proposal), a combination of two factors has been considered, namely the sensitivity of the viewpoint and the magnitude of change which would result from development. Predicted visual impacts are assessed on a five point scale, ranging from ‘negligible’, ‘slight’, ‘moderate’, ‘high’ through to ‘substantial’. Impacts can be either positive or negative and will be clarified as such.

“Sensitivity to change”. The levels of sensitivity have been evaluated earlier (refer Appendix 1, Tables 1 to 9), varying across a five point scale between low and high.

“Magnitude of change”. This has also been assessed on a five point scale, between very low and very high, taking into account three factors:

- i) distance of view, which determines the apparent size of the turbines
- ii) extent of the sea horizon that the wind farm would occupy
- iii) location of the wind farm in the view in relation to other features.

In general terms, a very high magnitude of change is expected within a 5km radius of the nearest wind turbine (experienced only at sea), and a high change would be anticipated within a 10km radius (generally along the North Wirral and South Sefton coastlines), where the array of turbines would occupy a significant part of the open sea horizon. A moderate change is predicted within 10 to 15km, where the wind farm would occupy a smaller proportion of sea views.

Over 15km there would be little interruption of the open sea view and therefore a low impact would be predicted, with a very low impact over 20km. The assessed magnitude of change may be further reduced where intervening landform obscures either the base of the wind farm or a proportion of turbines, or where distant landform features may appear behind the wind farm.

7.3.5.3 Areas of Substantial Predicted Impacts

No substantial impacts are predicted from any of the photomontages. The only receptors likely to experience such impacts are those on ferries or cruise liners approaching or leaving the Crosby Channel. However, considering the different viewing experience on board such vessels where new features are viewed with interest, especially approaching port, any such potential negative impact would be greatly reduced.

7.3.5.4 Areas of High Predicted Impacts

Although access is restricted, the sandy foreshore and dune systems around Formby Point are popular destinations for tourists and local visitors alike, who enjoy and use this attractive coastal environment for a wide variety of recreational and leisure purposes.

This is perhaps the most 'natural' of all the viewing areas along the coastlines within the region, and it has a high sensitivity to change such as that proposed. Being only 7.6km to the nearest turbine and with a wide extent of view (32.8 degrees within an open sea horizon), there would be a high magnitude of change at this viewpoint and the predicted visual impact of the proposed wind farm is therefore likely to be high. It should be noted, however, that the majority of visitors to this location come for recreation rather than to observe fine views, and therefore the significance of this impact would be reduced.

7.3.5.5 Areas of Moderate to High Predicted Impacts

Three areas are identified as having moderate to high impacts, namely Hilbre Island, the coastal footpath in front of Crosby Marina and the car park at Crosby Coastguard Station. These are either in areas where there is a high sensitivity to change and a moderate magnitude of change such as Hilbre Island (over 10km from the nearest turbine), or in areas of moderate sensitivity to change where there is a high magnitude of change, as in the latter two locations. This level of impact would also apply to first floor views from the Georgian terraces behind Crosby Marina where, although there is a high sensitivity to change, the magnitude of change is reduced by the marina and dune-type systems.

7.3.5.6 Areas of Moderate Predicted Impacts

Moderate impacts are predicted at Fort Perch Rock and the North Wirral Coastal Path each side of Leasowe Lighthouse. Although the magnitude of change from these locations is judged to be high, the fact that they are in areas where there is only a moderate sensitivity to change (due to the strongly engineered nature of the concrete sea defences) reduces the level of predicted visual impact.

7.3.5.7 Areas of Slight Predicted Impacts

Due to distance and/ or context of view, only slight impacts are expected at the Point of Ayr, St Elmo's Summer House, Everton Park, Southport Pier, Clieves Hill and the Anglican Cathedral. These are all in seascapes where, irrespective of the sensitivity of change, the magnitude of change is only scored as low, or sometimes even very low. The most notable area having a high sensitivity to change in this category is the northern flank of the Clwydian Range, but the low scoring on visual impact is due to its distance from the nearest wind turbine being over 20km.

7.3.5.8 Areas of Negligible Predicted Impacts

Lastly, only negligible impacts are predicted at the Nova Centre at Prestatyn, Thurstaston Common, Seaforth Flyover and the footbridge over the A55(T) south-east of Holywell. In the case of the Nova Centre and the A55(T), the low scoring is due to the distance from the wind farm (20 and 25km respectively). For Thurstaston Common, this is due to the very narrow window of open sea and the predominant view being north-west over the Dee Estuary. Finally, although closer to the proposed wind farm, a low impact is predicted at Seaforth flyover due to the intervening large containers, overhead cranes, storage buildings and lighting masts in the foreground.

7.3.6 Overview of Effects on Tourism and Local Economy

Effects on tourism and the local economy are set out in Chapters 6 and 8. No figures can be presented to illustrate the likely advantages or disbenefits that would be brought to the local economy as a result of the proposed offshore wind farm. However, should the installation proceed, there would be an intense interest in development through the construction and operational phases, and it is envisaged that the development would bring increased vitality and employment opportunities to the local economy, which could in turn have further-reaching positive effects within the region. A table in Technical Appendix G sets out the sensitivity to change from the most significant locations, schedules the predicted impacts from these locations and then shows which locations could benefit most from targeted interpretive and educational facilities.

7.4 Mitigation Measures

7.4.1 Introduction

A number of measures have been considered to mitigate potential visual impacts generated by the proposed offshore wind farm. The principal ones being precision of site location, the footprint of the wind farm, the arrangement of the turbine layout, and turbine colour.

It should be noted, however, that apart from the last measure, amendments to the other factors are all related to physical processes and aspects of operational efficiency and safety. For this reason, the final extent to which these measures have been incorporated in the final design has had to be determined by Seascope Energy.

It has not been possible to amend any issues relating to lighting on the turbines since these have to conform to the requirements of Trinity House Lighthouse Service, but as highlighted in section 7.3.1.6, these would be too faint to create any night glow and less distinct than the flashing marker buoy lights delineating the Crosby Channel

7.4.2 Site Location and Footprint

The choice of site location was determined by a number of issues, including appraisal of the general seascape and visual factors, seabed depth and composition, position of commercial shipping channels, locations of fish and migrant bird populations, and a range of other factors. Its subsequent manoeuvrability was also restricted by fairly stringent rules imposed by the Crown Estate. In terms of site footprint, it has already been shown in section 7.2.1 that this has been significantly amended in response to public consultations.

7.4.3 Turbine Layout

Three key aspects relating to site layout have been discussed at length within the team, namely optimum shape/ density, optimum pattern and optimum height/ distribution density, and these are all fully appraised in Technical Appendix G. Research has also been carried out of other wind farm proposals and best practice guidelines to determine the best layout at Burbo Offshore in relation to adjacent receptors, and the final layout of 4 arrays of 7 or 8 turbines is the recommended 'best-fit' solution.

7.4.4 Turbine Colour

There is no established technical basis for the choice of turbine colour but the most important considerations are elevation and aspect of view. For the proposed Burbo Offshore wind farm, the predominant elevation of the most important views are from the coast itself at around 10m AOD, in other words with the turbines 'sitting' on the horizon and the background being sky. The majority of views are also front-lit by the sun for much of the day. It is generally agreed that a lighter sky would predominate for these situations, and that the most appropriate colour for the turbines would therefore be light-grey to off-white. For viewpoints from higher elevations, it is considered that due to their distance from the site, the choice of colour would be less noticeable than if the turbines were closer, where a darker shade may be more appropriate.

7.4.5 Off-site and Onshore Mitigation

It is not considered that mitigation in the form of onshore tree planting would be either appropriate or necessary around the seascapes of the study area. Refer to Chapter 8, section 8.63, and Technical Appendix G for onshore mitigation measures.

7.5 Appraisal of Cumulative Effects

7.5.1 Description of Proposed Wind Farms

A number of proposed wind farms have also been considered by other developers offshore from Liverpool Bay and the North Wales coast, the closest of which is the North Hoyle Offshore wind farm which was granted consent in 2002. This also comprises 30 turbines of a similar size, arranged in a 6 by 5 grid formation, the closest of which is some 7.5km directly north of the coast from the Prestatyn Nova Centre. Another proposal exists further west at Rhyl Flats but is not considered here since it is outside the recognised limit of inter-visibility with the proposed Burbo Offshore wind farm.

7.5.2 Evaluation of Potential Cumulative Visual Impact

Reference should be made to Figures 15 and 16, the two cumulative ZVI maps, Figure 29 the Viewpoint Location and Geometry Plan for North Hoyle, and Figures 30 and 31 illustrating four representative viewpoints which are described below. The 'cumulative impact' of this assessment has been carried out on the basis that the wind farm at North Hoyle has already been constructed, and focuses on the level of change arising from the possible addition of the wind farm at Burbo Offshore.

7.5.3 Cumulative ZVI's

Reference should be made to earlier comments referring to the theoretical nature of these models, in that no account is taken of the screening properties of either built form or vegetative cover on the landform, and that potential visibility decreases with increasing distance due to the visual acuity of the human eye and to climatic conditions.

7.5.3.1 Figure 15, ZVI Map 4 (30km Cumulative Viewshed of Wind Farms)

This map shows the potential visibility of both wind farms within their respective 30km study areas. The area rendered red represents the extent of sea and land from which both wind farms would be visible. The zone rendered blue shows the potential area from which only Burbo Offshore would be visible, and that shown green represents areas from which only North Hoyle may be visible. Of note within the latter category are the north and north-western slopes of the Clwydian Range, and the western flank of the Wirral peninsula.

Areas sharing inter-visibility with both wind farms include the lower slopes of the Clwydian Hills and Western Dee regional seascape units (these being closer to North Hoyle), and the North Wirral and South Sefton regional seascape units (these being closer to Burbo Offshore). The areas shown in blue and red have already been described.

7.5.3.2 Figure 16, ZVI Map 5 (30km Cumulative Viewshed to Blade Tip of Turbines)

This map takes the areas of potential visibility of both wind farms and screens the numbers of individual turbines present, from none to sixty.

7.5.4 Cumulative Impacts from Photomontage Viewpoints

Descriptions are given for each viewpoint in Technical Appendix G of the likely cumulative effects of introducing the Burbo Offshore wind farm should that at North Hoyle already be in existence. These are summarised and tabulated below. To assist in visualisation, cumulative photomontages have also been prepared from four viewpoints, namely Point of Ayr (viewpoint 2), Hilbre Island (viewpoint 3), Crosby Marine Lake (viewpoint 9) and Formby Point (viewpoint 11). The same comments on rendering apply as with the Burbo Offshore Wind Farm.

Table 7.2 Summary of predicted cumulative visual impacts

No	Location	Magnitude of change	Predicted Visual impact
1	Prestatyn Nova Centre	Very low	Negligible
2	Point of Ayr viewing platform	Low	Slight
3	Hilbre Island	Moderate	Moderate
4	Thurstaston Common	Very low	Negligible
5	Leasowe Slipway	High	Moderate to high
6	Fort Perch Rock, New Brighton	High	Moderate to high
7	Everton Park circular car park	Low to mod	Slight
8	Seaforth flyover, north bound	Low	Negligible
9	Crosby Marina coast access pt	High	Moderate to high
10	Crosby Coastguard Station	High	High
11	Formby Point	High	High
12	Southport Pier	Very low	Negligible
13	Clieves Hill	Low	Slight
14	Anglican Cathedral	Low	Slight
15	Footbridge over A55, Holywell	Very Low	Negligible
16	St Elmo's Summer House	Low	Negligible

As well as full individual descriptions in the technical report, several of these viewpoints are mentioned in section 7.6.5 below to illustrate the potential cumulative impacts on seascape units within the study area.

7.5.5 Cumulative Impacts on Seascape Units

The Burbo Offshore site lies on the overlapping boundary of the North Wirral and Crosby/ South Sefton Regional Seascape Units, and North Hoyle lies within the Clwydian Hills unit. The following brief summary of potential cumulative effects on seascape character has been drawn up on the basis of the cumulative ZVI's and the visual assessments above, but the full appraisal is set out in Technical Appendix G. Comments on capacity for change and receptor sensitivity are not repeated here.

7.5.5.1 Clwydian Hills and Western Dee Regional Seascape Units

Compared with the presence of North Hoyle some 7.5km off the North Wales coast, the addition of Burbo Offshore in the seascape (at around 20km from most of the sensitive receptors) is not likely to affect the level of visual impact from viewpoints within these units. Most of these are around 20km distant from Burbo Offshore. The only exception is the viewing platform at Point of Ayr at 16km, but with the visual focus directed towards North Hoyle by the lighthouse this cumulative addition would only be slight. Similar comments apply to views from St Elmo's Summer House, with the existing mast focussing views on North Hoyle.

7.5.5.2 Eastern Dee and Mersey Regional Seascape Units

If North Hoyle was already established, the addition of Burbo Bank would not generate any adverse visual impact due to the restricted nature of visibility towards the latter from both units. From the Eastern side of the Dee, the main visual impacts would remain westward to North Hoyle.

7.5.5.3 North Wirral Regional Seascape Unit

Should the North Hoyle wind farm be present when Burbo Offshore is constructed, this would increase the level of visual impact from potential vantage points, mostly along the coast. However, since they are generally in fairly engineered contexts and since the unit has been evaluated as having a moderate capacity for change, it is considered that this increased visual impact could be accommodated without significantly changing the character, quality or value of the seascape.

Some sensitive receptors are present, for instance along Hoylake seafront and Warren Drive in New Brighton, and notably Hilbre Island. Being 10.4km from Burbo and 13.2km from North Hoyle, the predicted level of increased visual impact from Hilbre Island would perhaps be greatest for any of the featured viewpoints. However, this potential impact is reduced firstly by being over 10km from Burbo, secondly by its context within such an expansive sea horizon, and thirdly by the high ground of the Clwydian Range which tends to draw the eye westwards.

7.5.5.4 South and North Sefton Regional Seascape Units

These units have been evaluated as having a moderate to high capacity to absorb change in the seascape, with generally low receptor sensitivity

apart from the sensitive receptor group at Waterloo. Running views from the Sefton Coastal Footpath are also obtained across the sea horizon.

At 25 to 27km distant, the wind farm at North Hoyle would not achieve visual significance in the seascape. Although the addition of another wind farm at Burbo Offshore would present a high magnitude of change from potential viewpoints, given the fact that the North Hoyle wind farm is approaching the limit of visual acuity, this addition would not appear as a significant cumulative impact.

Even in conditions when North Hoyle may be visible, given that the sensitive receptor groups are few in number and that most are in the context of a landscape strongly influenced by man, it is considered that this unit does have the capacity to receive this second wind farm without significant loss or detriment to either the value or quality of the seascape.

7.6 Consultees and Public Responses

A full Scoping Study was carried out during the summer months of 2001 with extensive consultation, prior to being published as a Scoping Report. This has served a very useful purpose in highlighting initial concerns of various statutory and non-statutory consultees, to which response has been made in the progression of the wind farm design.

The client has continued to meet and correspond with interested parties since publication of the above document (refer separate appendices), culminating in the public meetings at Fort Perch Rock and Crosby Coast Guard Station. The wind farm configuration was further amended following representations at the latter meeting.

Further consultation was carried out in June 2002 to gauge responses to the amended layout and current proposals from a purely seascape and visual perspective. Eighteen letters were sent out to major consultees as scheduled in Appendix 5 of Technical Appendix G. Letters from those who responded are also included in this appendix. This was a useful exercise which also served to show the increasingly positive public perception toward offshore wind farms.

7.7 Conclusion

'Seascape' is a generic term comprising the effect on landscape of the sea and land interface, where views are obtained along the coastline, from sea to land and from land toward the proposed development at sea. The seascape between the Vale of Clwyd on the North Wales coast and the Ribble Estuary has been evaluated for this assessment.

The proposed Burbo Offshore site lies precisely on the dividing line between two national seascape units, and within these lie seven distinct

regional seascape units, the closest to the site being North Wirral and Crosby/ South Sefton. These closest regional seascape units both have a moderate capacity to accommodate change, and in their national context have a moderate to high capacity for change.

Five Zone of Visual Influence Maps (ZVI's) and 16 photomontages (see Volume 3) were produced to predict the visual impact of the proposed development, taking into account the sensitivity of seascape and receptors to the proposed change and the extent of change in the view.

The scale of visual impact would be highest from those viewpoints closest to the proposed development where sensitivity of receptors is high, the viewpoint is within 10km, and where a significant change to the baseline condition is expected. The only viewpoint within this category is Formby Point, although it is mitigated by a more difficult access route and the fact that most visitors come to enjoy coastal recreation rather than fine views. Moderate to high impacts are predicted for Hilbre Island, the Sefton Coastal Path adjacent Crosby Marina, first floor views from the terraces behind Crosby Marina, and Crosby Coastguard Station.

Moderate impacts are predicted at Fort Perch Rock and the North Wirral Coastal Path each side of Leasowe Lighthouse. Due to distance and/ or context of view, only slight impacts are expected at Point of Ayr, St Elmo's Summer House, Everton Park, Southport Pier, Clieves Hill and the Anglican Cathedral. Lastly, only negligible impacts are predicted at the Nova Centre at Prestatyn, Thurstaston Common, Seaforth Flyover and the footbridge over the A55 south-east of Holywell.

Impacts on sea-faring vessels would be substantial, with passengers from ferries and cruise liners potentially passing within 3km of the proposed development, and recreational and fishing vessels even closer. However, in view of the respective nature of their presence on the sea, the level of these impacts on marine receptors is not likely to be significant.

An appraisal has also been undertaken for the onshore cabling and sub-station (see Chapter 8). It has been shown that the former would have no landscape or visual effects, and the landscape and visual effects of the latter would be minimal, but with some opportunities for limited mitigation. Optional layouts and mitigation measures have also been considered.

Lastly, an assessment has also been made of the cumulative effect of Burbo Offshore in combination with another wind farm off the coast of Prestatyn, which does not present adverse effects on seascape character from most viewpoints within the study area.

In conclusion, it has been demonstrated that the proposed location for the Burbo Offshore wind farm would be in a seascape that has a reasonable capacity to accommodate the development, where most predicted visual impacts would only be negligible, slight or moderate, with only one being classified of high impact.

NOTES