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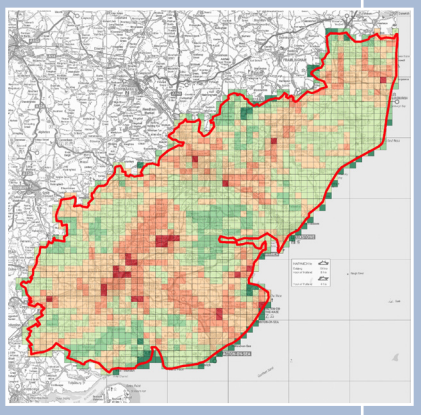
Environmental Capacity in the East of England:

Applying an Environmental Limits Approach to the Haven Gateway

Final Report



Prepared for the East of England Regional Assembly and Partners by Land Use Consultants

ENVIRONMENTAL CAPACITY IN THE EAST OF ENGLAND:

Applying an environmental limits approach to the Haven Gateway

FINAL REPORT

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by
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PROJECT BACKGROUND, PURPOSE AND APPROACH

'Living within environmental limits' is a central theme of Government policy for sustainable development. In the East of England context, concern was expressed at the Examination of the draft Regional Spatial Strategy that the proposed scale and location of growth could exceed the environmental capacity of the region, or that environmental limits could be breached.

To respond to these issues, the East of England Regional Assembly and partners commissioned this project to develop a method that assists spatial planning in the East of England at the regional and sub-regional scales by taking account of environmental capacity issues.

The concepts of 'environmental capacity' and 'environmental limits' are essentially very similar; both refer to the amount of development the environment can accommodate. The latter term is used in this report, as this relates better to the current national policy on 'living within environmental limits'. Broadly in common with Defra's Action Plan for embedding an Ecosystems Approach, we use the term environmental limits to refer to '*the point or range of conditions beyond which the benefits derived from environmental resources are judged unacceptable or insufficient*'. The meaning of 'environmental limits', key drivers for reflecting them in spatial planning and past attempts to do so are explored in **Chapter 2**.

The proposed method for applying the principle of environmental limits to spatial planning, detailed in **Chapter 3**, was defined in the light of an extensive literature review and consultation with the Steering Group and wider stakeholders. The method was tested on the Haven Gateway, a sub-region of the East of England that has 'Growth Point' status. Key regional stakeholders were consulted when defining and characterising the Haven Gateway's environmental assets. The Haven Gateway case study is described in **Chapter 4**. Feedback was obtained from the Haven Gateway Partnership, EERA's Environment and Resources Panel and Defra's Strategic Natural Environment Unit before finalising the project report.

KEY FEATURES OF THE ENVIRONMENTAL LIMITS METHOD

The key features and prerequisites to the successful application of the method include:

- The need to distinguish between the receiving environment (environmental assets), the pressures on it (such as traffic, waste and development that exacerbates flooding), and the spatial planning responses that need to be made.

- Recognition that the importance of the environment is derived from the services or benefits it provides - the method takes account of the types of service identified by the Millennium Ecosystems Assessment[1] but the limited data on provision of these services

[1] The Millennium Assessment is an international initiative to examine the consequences of ecosystem change on human wellbeing, based on contributions of 1,300 researchers over a five year period. See http://www.millenniumassessment.org .

meant that emphasis was placed on consideration of the state of the environment, using appropriate indicators.

- Distinction between environmental issues that operate at a broad scale, to which a generic policy response is required (e.g. greenhouse gas emissions) and those for which the effects of development are spatially distinct at a sub-regional scale (e.g. landscape).
- Environmental limits in a particular region or sub-region need to be predetermined and supported by stakeholders if they are to form key parameters for strategic planning.
- The current state of the environment relative to limits is presented using a two state model - either the state of the environment is within defined limits and is classed as 'acceptable' or it exceeds those limits and is classed as 'unacceptable'.
- All spatial datasets representing the state of the environment are converted to a grid of 1km x 1km squares, allowing diverse environmental data to be simplified and presented in a common format.

THE FIVE STEP METHOD

The proposed method proceeds through five steps, as follows:

- Step 1: Characterise the environment and identify issues.
- Step 2: Assess importance of environmental assets or services.
- Step 3: Define and validate key limits.
- Step 4: Illustrate current state in relation to limits.
- Step 5: Assess implications for development.

CONCLUSIONS

The conclusions and recommendations of the study are summarised here and detailed in **Chapter 5** of the project report.

In considering environmental capacity issues, decision makers want to know how much development can be accommodated in an area without causing an unacceptable decline in environmental quality and the benefits or services that people derive from it.

It was concluded early on in the study that the paucity of data on the condition of the environment and the lack of scientific tools for analysing the changes in the environment that are likely to result from different amounts and types of development mean that this question cannot currently be answered.

It was nevertheless possible to design and test a practical method which allows environmental limits to be taken into account in a consistent and transparent way in the spatial planning process. This improves on current environmental planning practice in the following ways:

- The five step method is the first attempt to give expression comprehensively to environmental capacity concepts in the strategic planning field, helping to inform more spatially-specific policy responses to environmental limits.

- The method brings together the wide range of environmental information of which planning needs to take account in a consistent format that is readily understood by non-technical data users.

- Analysing environmental state relative to limits provides a basis for assessing the significance of development impacts, for example in support of Sustainability Appraisal (SA)/Strategic Environmental Assessment (SEA). The locally informed and spatially specific nature of the environmental limits defined in the methodology can also support identification of actions to mitigate development plan impacts, an integral part of the SA/SEA process.

- Stakeholder involvement in and clear definition of environmental indicators and limits provides a way of integrating objective, scientific knowledge and subjective, societal views in a more transparent way than is currently the case and makes existing value judgements within planning more explicit.

RECOMMENDATIONS

A number of recommendations arise from this study, in respect of how regional and sub-regional spatial planning can take better account of environmental limits:

- The regional policies in respect of spatially non-specific environmental capacity issues such as climate change need urgently to be translated into action through sub-regional strategies that are fully integrated and consistent with the RSS.

- Improvements to environmental monitoring data are required. We recommend greater coordination, management, analysis and resourcing of environmental monitoring from regional bodies and Local Planning Authorities. National bodies such as Natural England and the Environment Agency need to continue to promote consistency by defining and improving standard data collection and analysis methods and could also provide expert guidance on which of the currently available datasets can best be used to assess current environmental state relative to limits.

- Determination of environmental limits and appropriate indicators early on in the planning process is essential, with the support of key stakeholders and the public.

- National guidance is required on how the 'living within environmental limits' agenda and 'the ecosystems approach' can be embedded in the planning system, including CLG guidance on the need to consider environmental limits within SA and suggested methods for this.

- EERA should promote and support the environmental limits approach to gain recognition for it within regional and national bodies, and to bring more certainty to and support for the most suitable environmental indicators and limits. In the longer term, this will allow the proposed method to be adopted as a framework for maintaining the profile of the

environment in the move to the new, integrated system of regional planning prescribed by the Sub-National Review.

1. INTRODUCTION

PROJECT BACKGROUND AND PURPOSE

1.1. 'Living within environmental limits' is a central theme of Government policy for sustainable development, expressed in particular in the UK Sustainable Development Strategy and Planning Policy Statement 1. In the East of England context, concern was expressed at the Examination of the draft Regional Spatial Strategy that the proposed scale and location of growth could exceed the environmental capacity of the region, or that environmental limits could be breached.

1.2. To respond to these issues, in January 2007 the East of England Regional Assembly (EERA) and partners[2] commissioned this project to develop a method that assists spatial planning in the East of England at the regional and sub-regional scales by taking account of environmental capacity issues. It was agreed that the method should be tested on the Haven Gateway, a sub-region of the East of England that has 'Growth Point' status.

1.3. Land Use Consultants undertook the project, with inputs from Cranfield University on the technical aspects of Stage 1. The project Steering Group comprised representatives of the funding partners and a range of other regional environmental bodies (see **Appendix 1**). LUC gratefully acknowledges the roles played by the Steering Group and Cranfield University in the project.

1.4. Draft outputs of the study were presented to the Haven Gateway planners, EERA's Environment and Resource Panel (ERP) and Defra's Strategy Unit for the Natural Environment and their comments informed this final project report.

METHODOLOGY

1.5. The project was undertaken in four main stages, each culminating in an interim report that was presented to the Steering Group before completion and publication on EERA's website[3]. In summary, the four stages involved:

- Stage 1: a review of literature on environmental capacity and limits; production of draft Topic Reports that define and characterise the Haven Gateway's environmental assets in consultation with key stakeholders[4];
- Stage 2: completion of Topic Reports and production of a draft method;
- Stage 3: application of the method to the Haven Gateway sub-region; refinement of the method;

[2] The funding partners were the East of England Regional Assembly, Natural England, East of England Development Agency, the Government Office for the East of England, the Environment Agency and English Heritage

[3] http://www.eera.gov.uk/

[4] The Stage 1 Topic Reports were finalised in July 2007. The following topics were addressed: air; water-based flora and fauna; marine-based flora and fauna; landscape; open space and the historic environment.

- Stage 4: consultation with the Haven Gateway Partnership, EERA's Environment and Resources Panel and Defra's Strategic Natural Environment Unit; production of this Final Report.

1.6. In addition to the reports for the four stages, an additional output of the project was an interactive GIS tool for spatial analysis of the environment relative to limits. This tool, described in **Chapter 3**, was supplied to the Steering Group and further information concerning its wider availability will be made available on EERA's website.

TERMINOLOGY

1.7. The concepts of 'environmental capacity' and 'environmental limits' are essentially very similar; both referring to the amount of development the environment can accommodate. The latter term is used in this report as it relates better to the current national policy on 'living within environmental limits'.

1.8. Broadly in common with Defra's Ecosystems Approach[5], we use the term environmental limits to refer to 'the point or range of conditions beyond which the benefits derived from environmental resources are judged unacceptable or insufficient'.

1.9. We also use the term 'environmental threshold', which refers to 'the point at which the functioning of an environmental asset or the services it provides, experiences a rapid decline or sudden collapse'.

1.10. It should be noted that the usage of the terms 'limit' and 'threshold' in this report differs from that adopted during earlier stages of this project and appearing in the Stage 1 – Stage 3 Reports. This change provides consistency with Defra's Ecosystems Approach terminology.

STRUCTURE OF THIS REPORT

1.11. This project report is structured as follows:

- **Chapter 2** provides a context to the project, including a discussion of the links between environmental limits and spatial planning and the scope of spatial planning to respond to environmental limits;
- **Chapter 3** describes and justifies the key features of the proposed method before setting out the five steps of the method itself;
- **Chapter 4** further illustrates the five step method by describing how it was applied in the Haven Gateway case study, as well as presenting the results of this application**;**
- **Chapter 5** draws conclusions and makes recommendations.

[5] Defra (2007) Securing a healthy natural environment: An action plan for embedding an ecosystems approach.

2. ENVIRONMENTAL LIMITS AND SPATIAL PLANNING

WHAT DOES LIVING WITHIN ENVIRONMENTAL LIMITS MEAN?

2.1. The concept of 'living within environmental limits' is based on two key notions. First, that the environment is very important: it is irreplaceable, has intrinsic value and provides the foundations for human activity. This applies to the less quantifiable aspects of the environment, such as landscape character and the historic environment, as well as the life support systems provided by air and water. Second, that there are limits to the capacity of the environment to accommodate development, beyond which unacceptable change will result.

2.2. The UK Sustainable Development Strategy includes a commitment to develop, with stakeholders, a clear vision and coherent approach for the UK to protect and enhance the natural environment. Defra's Ecosystems Approach project seeks to meet this commitment. In November 2007 Defra published an action plan for embedding an Ecosystems Approach in policy and decision-making in England[6]. One of the core principles of this approach is ensuring environmental limits are respected in the context of sustainable development, taking into account ecosystem functioning.

KEY DRIVERS FOR EMBEDDING THE PRINCIPLE OF ENVIRONMENTAL LIMITS IN SPATIAL PLANNING

Sustainable development policy

2.3. Since the 1990 Environment White Paper 'This Common Inheritance', the pursuit of sustainable development has been a key objective of the land use planning system. The protection and enhancement of the environment is one of the key tenets of sustainable development.

2.4. 'Living within environmental limits' is one of three key themes of the 2005 UK Sustainable Development Strategy. This has been translated into planning policy through Planning Policy Statement 1, which states that Plan policies and planning decisions should be based on, amongst other things '*Recognition of the limits of the environment to accept further development without irreversible damage*'.

2.5. Defra's Ecosystems Approach Action Plan states that embedding the ecosystems approach in the planning system will help it achieve its overarching goal of sustainable development by, amongst other things, improving the information available to planners.

2.6. Central to the Government's definition of sustainable development is the concept of 'inter-generational equity', which emphasises the need to consider the environmental legacy of the current generation to future generations. Transparent consideration of environmental limits is important in this regard.

[6] Ibid

Climate change

2.7. The call for spatial planning to respond to environmental limits stems from global as well as local concerns. At a global scale, it is becoming increasingly clear that human activities are having an unsustainable impact on the planet's climate and its natural resources. As the body of evidence around the causes of climate change becomes stronger, it is increasingly apparent that we are in a 'deficit' situation – we have already breached the limit of greenhouse gas emissions that can be sustained without causing climate change. This has drawn attention generally to the concept of environmental limits and need for a much more cautious approach to human development.

2.8. The spectre of climate change has also focused attention on how the environment will be affected. Concerns have been expressed about significant changes in biodiversity and landscapes and, in some locations, an increased risk of fluvial or marine flooding – potentially resulting in major social and economic impacts, as well as environmental ones. As the new Planning Policy Statement on Climate Change[7] indicates, spatial planning can play a key role in helping both to mitigate the causes of climate change and to adapt to it.

Environmental character and local distinctiveness

2.9. England's Growth Areas and Growth Points are a key product of the Sustainable Communities Plan, which the Government expects to be delivered through the statutory planning process. Collectively they seek to promote the development of around 0.5 million new homes by 2020.

2.10. The recent round of Examinations in Public of the Regional Spatial Strategies, however, has led to concern about the impact of development on the environmental character and distinctiveness of the English Regions and, more widely, the environmental capacity of the regions to accommodate such high levels of growth.

2.11. The Secretary of State for Communities and Local Government has come under pressure to address the issue and in response to an MP whose constituency partly falls within a Growth Area, the Secretary of State for Communities has acknowledged that the regions have not formally assessed environmental capacity[8]. This suggests that a conflict might exist between the sustainable development principle of 'living within environmental limits' agenda, on the one hand, and the growth agenda of the Sustainable Communities Plan on the other.

From "predict and provide" to "plan, monitor and manage"

2.12. The Government's recommended 'plan, monitor and manage approach' to the provision of housing land through the planning system requires an understanding of environmental limits. Until such data are forthcoming, the 'predict and provide' approach will remain commonplace.

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[7] PPS Planning and Climate Change, Supplement to PPS1, December, 2007

[8] Anne Main, MP for St. Albans, 18 April 2007, quoted in Hansard 'I asked the Department for Communities and Local Government whether this Government prepare any studies on environmental capacity to accept any housing in particular areas in relation to regional spatial strategies. I was told: "*The Government does not prepare any such documents*" and that "*the initial housing projections are based upon demographic and not environmental considerations.*" '

Environmental economy

2.13. Large sections of the economy are dependent on a high quality natural environment (e.g. agriculture; tourism and recreation) or contribute to it (e.g. environmental technologies; consultancy). This is as borne out by a variety of studies of the 'environmental economy'.[9,10,11,12]

HOW CAN ENVIRONMENTAL LIMITS BE REFLECTED IN SPATIAL PLANNING?

2.14. Although not described as such, the principle of environmental limits has always underpinned planning. The designation of national parks, historic monuments and other protected areas is essentially a recognition of spatial thresholds or environmental limits. Development control is also about defining limits to development, although environmental limits are generally not made explicit.

2.15. In seeking to embed the principle of environmental limits into spatial planning in a more robust and transparent way, two key challenges arise. The first of these is agreeing how environmental limits should be defined and in particular, the extent to which they are a function of social and technological factors rather than scientific absolutes. The second and related challenge arises from the scope and influence of the spatial planning system.

Scientifically or socially determined limits?

2.16. At one extreme, environmental limits can be seen as a development of the concept of the 'carrying capacity' of species populations in the management of ecosystems. If the carrying capacity of a habitat is diminished, for example, certain species will no longer flourish, or even die. This suggests that absolute constraints on the location of development can be defined scientifically.

2.17. At the other extreme, environmental constraints can be viewed as almost irrelevant to a human society which is able continually to improve the efficiency of its resource use and to overcome local limits by freely importing resources and exporting waste to other locations.

2.18. In reality, both viewpoints are valid, dependent on scale. As Rydin[13] suggests, it is clearly not the case that a locality in Britain has a finite capacity for supporting a human population in the same sense that an area of open land has capacity for a given population of, say, rabbits. Extremely high population densities (in the Haven Gateway for example) are possible for human populations; technological investment, evolving modes of social organisation and the ability to import resources and to

[9] Land Use Consultants, SQW Limited & Cambridge Econometrics (2002) The Environmental Economy of the South East.
[10] GHK Consulting, GFA-Race Partners (2004) Revealing the Value of the Natural Environment in England.
[11] Terra Consult (2006) Review of the Value of the Environment to the South West Region's Economy.
[12] Environmental Prosperity Partnership (2001) Environmental Prosperity - Business and the Environment in the East of England. Cambridge: SQW; London: Land Use Consultants.
[13] Rydin, Y. (1998) Land Use Planning and Environmental Capacity: Reassessing the Use of Regulatory Policy Tools to Achieve Sustainable Development. Journal of Environmental Planning and Management, 41(6), 749-765.

export waste render urban development potentially unaffected by local environmental constraints.

2.19. At the same time, the globe and every area of land or water on it has finite resources and we only live beyond these by taking more from elsewhere. Developed western nations are recognised as consuming resources as though they had access to three planets and the Millennium Ecosystem Assessment[14] concluded that two thirds of the world's ecosystems were in decline or managed unsustainably. There is therefore growing concern over human impact on the environment, in terms of climate change, loss of biodiversity, desertification, and pollution. This is reflected in a growing body of European policy and legislation on protection of the environment which is expressed in UK national policy and legislation.

Issues of scale and scope

2.20. As described above, consideration of environmental limits requires thinking at a broad spatial scale since both the inputs to and outputs from human consumption move freely across administrative boundaries. This poses a particular challenge to the management of development within environmental limits by the UK planning system which principally operates at the local scale, through Local Planning Authorities.

2.21. In addition, the scope of planning has traditionally been limited to regulating the development and use of land in the public interest. Its ability to deal with the environmental impacts of development has thus been constrained since those impacts are driven as much by the manner in which development is carried out and the behaviour of the people who live and work there as the scale and location of the development. In addition, since planning is only concerned with change, the positive influences which it can have on the environmental impacts of development are by definition incremental.

Towards an integrated approach to spatial planning

2.22. In developing an approach to managing development within environmental limits, this study seeks to integrate the scientific and social views of such limits. In doing so, we recognise the inherently political nature of environmental capacity described by Jacobs[15]. He argues that, whilst science can define thresholds at which natural systems undergo change, the identification of a 'critical threshold'[16] is socially chosen, not scientifically observed and that, for important aspects of capacity relating to the quality, character and cultural importance of landscape and settlements, this social judgement is all there is. As a result, Jacobs concludes that the democratic process must determine the 'critical thresholds'.

2.23. At the same time, this democratic determination of limits must recognise that the environment represents a finite resource at the global scale and that joined up planning between planning and regulatory bodies is needed to address it. Within the

[14] http://www.maweb.org
[15] Jacobs (1997) 'Making sense of Environmental Capacity', report for CPRE.
[16] Jacobs terminology differs from that adopted in this report – his term 'critical threshold' has broadly the same meaning as our term 'environmental limit'

UK, the emergence of the regions as a basis for policy making represents an opportunity to address these inconsistencies and to develop a more integrated and joined up approach to economic, environmental and spatial planning informally through the encouragement of a regional debate about development and sustainability and formally through the drafting of the Integrated Regional Strategy.

PREVIOUS WORK ON ENVIRONMENTAL CAPACITY / LIMITS

2.24. The 1990s saw of a flurry of activity in the planning field related to environmental capacity and limits. Most notably, some County Councils applied capacity methodologies to minerals planning and to the preservation of historic towns. The impetus for the environmental capacity studies of specific areas was to present an argument that the target for housing provision should be lower than that set by Government or by the Strategic Planning Authority. The highest profile example was that of West Sussex where the Panel Report of June 1997 following the EiP commented on the work undertaken to examine the constraints to development imposed by environmental assets, that: '*....our general conclusion is that the study does not permit the precise calculation of the development capacity for West Sussex'*.

2.25. A second notable example was the Chester environmental capacity study[17] which considered the 'environmental capacity' of Chester to accommodate development and activity without having a detrimental impact on the special character of the City. The Study identified a number of features that make Chester special, including the compact nature of the City, well defined edges to parts of the urban area, environmental features such as its rivers, and its historic buildings and monuments. A framework for measuring environmental capacity was put forward, consisting of a series of 'capacity guidelines' against which development strategies could be assessed.

2.26. With a few notable exceptions, the application of environmental capacity concepts to planning has been mainly theoretical and focused on a limited rage of environmental issues. To embrace the concept fully and practically would require: the development of a suitable and agreed methodology; potentially a rethink of the designations-led approach; and availability of significantly more environmental data than at present.

[17] See http://www.chester.gov.uk/main.asp?page=851&theme=print

3. THE PROPOSED ENVIRONMENTAL LIMITS METHOD

3.1. As noted in **Chapter 1**, one of the project goals was to develop a method that assists regional spatial planning by taking account of environmental limits. The proposed method was defined in the light of an extensive literature review and consultation with the Steering group and wider stakeholders. This chapter describes the key features of the method. This is followed by a description of the method, which involves five key steps. The degree to which the project goal was achieved and the strengths and limitations of the method in its current form are discussed in **Chapter 5**.

KEY FEATURES OF THE METHOD

Broader scale 'global' issues and spatially distinct 'local' issues

3.2. The complexity of the environment makes determination of overall environmental limits very difficult. In order to break into the problem, it is therefore helpful to disaggregate the environment into separate topics or assets.

3.3. Environmental issues can be broadly categorised into those that operate at a broad scale, to which a generic policy response is required (e.g. greenhouse gas emissions) and those for which the effects of development are spatially distinct at a sub-regional scale (e.g. landscape).

3.4. Two broad scale environmental issues which are fundamental to any consideration of sustainable development are the level of greenhouse gas emissions from human activity and the sustainable level of human consumption of the planet's renewable natural resources. The global scale at which both of these capacity constraints act means that, unlike the other environmental capacity issues considered in this report, they cannot inform the location of development within the a sub-region or the East of England as a whole, only the amount and type of that development.

3.5. The spatially distinct sub-regional issues include the following topics that accord with the SEA Directive:

- Air;
- Water;
- Soil and geology;
- Land based flora and fauna;
- Marine based flora and fauna;
- Landscape;
- Open space and Historic environment.

Environmental limits need to be predetermined and supported by stakeholders

3.6. If environmental limits are to form key parameters for strategic planning, they need to be determined early in the planning process. They also need stakeholder and public support.

3.7. The UK's democratic planning process lends itself well to this approach, as environmental limits could change over time (as data improve) and between different geographic areas depending on the nature of the environment.

The precautionary principle

3.8. The methodology requires the definition of environmental limits. Where significant uncertainty exists as to the appropriate level at which to set these limits, it is suggested that they be defined on a precautionary basis and that environmental changes are closely monitored so that the limit can be modified if required.

Interactivity

3.9. One of the project outputs is an GIS-based tool which can be used to illustrate spatially the state of the environment relative to limits at any location within the Haven Gateway. The interactive nature of this tool includes the ability to:

- turn individual map layers on or off to create different overlay views;
- view the data at a variety of scales by zooming in and out;
- determine which limits have been exceeded in any particular 1km grid square on the composite map;
- view more detailed underlying information in individual grid squares e.g. which Buildings at Risk contribute to exceedance of the limit in a 1km square of the Historic Environment limits map.

Simplicity and a common format

3.10. The challenge is to find an approach that mirrors the simplicity of environmental designations, but accurately reflects environmental limits. Analysis of the current state of the environment relative to limits lends itself to presentation of environmental data according to a two state model whereby the state of the environment does not exceed defined limits and is classed as 'acceptable' or it fails to meet the limit and is classed as 'unacceptable'. The method therefore not only simplifies the interpretation of complex environmental data for non-experts but also allows the wide variety of environmental issues to be illustrated in a common format.

3.11. Given this simplicity of presentation, it is important that clear signposts to more detailed examination of the data are provided, including a description of the indicator(s) used to represent the state of each environmental topic, the definition of the limit and references (or interactive links) to underlying data sources. The possibility of adding a third category, 'approaching unacceptability', was considered

but ultimately rejected because of the limitations of the underlying data sources available for the case study.

3.12. Another feature of the adopted method which allowed for simplification and presentation of diverse environmental data in a common format was the conversion of all spatial datasets representing the state of the environment to a grid of 1km x 1km squares. This also helps to avoid giving a false impression of accuracy if a user of the interactive map zooms in to a very detailed scale (the tool is only intended to support spatial planning at a strategic scale) and has the technical advantage of allowing the interactive GIS maps to be loaded more quickly, making the interactive tool more useable.

Distinguishing between the state of the environment and the pressures on it

3.13. The method distinguishes between the receiving environment (environmental assets), the pressures on it (such as traffic, waste and development that exacerbates flooding), and the spatial planning responses that need to be made. This approach reflects the Pressure-State-Response framework, which defines the links between pressures exerted on the environment by human activity, changes in the state of the environment and society's responses aimed at relieving those environmental pressures[18].

Recognition of environmental services and benefits

3.14. The importance of the environment to human wellbeing is derived from the services or benefits it provides. The method takes account of the Millennium Ecosystem Assessment[19] which categorises these services (referred to as 'ecosystem functions') into four groups as follows:

- *Supporting functions*, such as nutrient cycling, soil formation and primary production;
- *Provisioning functions*, such as the production of food and fibre;
- *Regulation functions*, covering the role that ecosystems have in controlling climate, disease, flooding and water supply; and,
- *Cultural functions*, which include spiritual, aesthetic, educational and scientific roles that ecosystems can fulfil.

3.15. However, a key conclusion of the Topic Reports prepared during the testing of the method in Haven Gateway was that data available on the provision of these services are very limited. A service provided by landscapes, for example, is the creation of a sense of place. Sense of place is hugely difficult to measure, as it is a perceptual issue,

[18] Used by OECD, SCOPE and other national and international organizations for environmental performance. See Dumanski, J and Pieri, C (1997) Application of the pressure-state-response framework for the land quality indicators (LQI) programme. In: FAO. Land Quality Indicators and Their Use in Sustainable Agriculture and Rural Development.

[19] http://www.millenniumassessment.org

so we must rely on consideration of the state of the landscape itself, using appropriate indicators.

Support for the SA/SEA process

3.16. Sustainability Appraisal (SA) is concerned with promoting an integrated approach to sustainable development – covering social, economic and environmental issues. It fails, however, to reflect fully the irreplaceable nature of many aspects of the environment. Rather than identifying limits to development, its purpose is to report on whether development proposals will move towards or away from environmental (amongst other) objectives. Of itself, therefore, SA does not represent a tool for ensuring that limits are not breached. Regional Spatial Strategies (RSS) and Local Development Documents (LDD) undergoing SA also require Strategic Environmental Assessment (SEA). SEA aims to assess whether '*plans or programmes are likely to have significant environmental effects*[20]'.

3.17. The environmental limits method can support the SA/SEA process by improving its evidence base in two important ways:

- by presenting a broad range of relevant environmental information to the assessor in a common and readily understood format (see 'Simplicity and a common format' above); and
- by helping to determine whether the likely environmental impacts of the plan or programme meet the SEA Directive's significance test.

3.18. In relation to the second point, the SEA Directive specifies criteria for determining likely significance, including the '*value and vulnerability of the area…due to special natural characteristics or cultural heritage* (or) *exceeded environmental quality standards or limit values*[21]'. Our recommended process for defining environmental limits takes account not just of scientific knowledge but also of local perceptions of the relative value of environmental features or benefits. This allows both the expected magnitude of environmental change and the sensitivity of local receptors to this change to be considered. In so doing it can capture within the resulting limits definitions many of the SEA Directive's significance criteria and provide a more robust basis for assessing significance than existing approaches.

3.19. SEA of development plans also requires measures to be proposed to prevent, reduce or offset adverse environmental effects. By ensuring that environmental limits are locally defined, the methodology also enables more spatially specific conclusions to be drawn about where within the plan area environmental mitigation may be required and in respect of which environmental assets or services.

[20] European Commission (2001). *Directive 2001/42 on the assessment of the effects of certain plans and programmes on the environment.*
[21] Ibid

THE FIVE STEP METHOD

3.20. The proposed method proceeds through five steps, as summarised in **Figure 3.1**, and described below. Chapter 4 elaborates on each step, by reference to the pilot application of the method in the Haven Gateway.

Step 1: Characterise the environment and identify issues

3.21. This step identifies, in consultation with relevant stakeholders, the range of global and sub-regional environmental issues to be addressed through application of the method. It then reviews the available environmental monitoring data to determine which can best represent the current state of each environmental asset or service. Currently, data are generally only available to measure the state of environmental assets but future applications of the method should replace these indicators with measures of the state of the environmental services provided by the assets, as such data become available.

Step 2: Assess importance of environmental assets or services

3.22. Having established the range of topics to be considered, this step aims to provide the decision-maker with an improved understanding of both the generic importance of each topic area and their relative importance in the local context. Degrees of importance can be used to inform trade-offs between the various environmental capacity issues under consideration and with social and economic considerations. This importance might vary from one place to another and over time, depending on the priorities of those consulted. Reference can be made to the regulatory requirements of national or international obligations (e.g. under the Water Framework Directive, Habitats Regulations or Ramsar Convention) or differences in the intrinsic nature of different environmental assets, for example their substitutability. There is, however, no single 'technocratic' answer to the question of importance.

Step 3: Define and validate key environmental limits

3.23. The next step is to define a limit for each environmental asset or service – the point at which the state of each becomes unacceptable within the study area. The limits should be validated through stakeholder consultation. Particular attention should be given to the environmental issues considered to be of most importance (see Step 2).

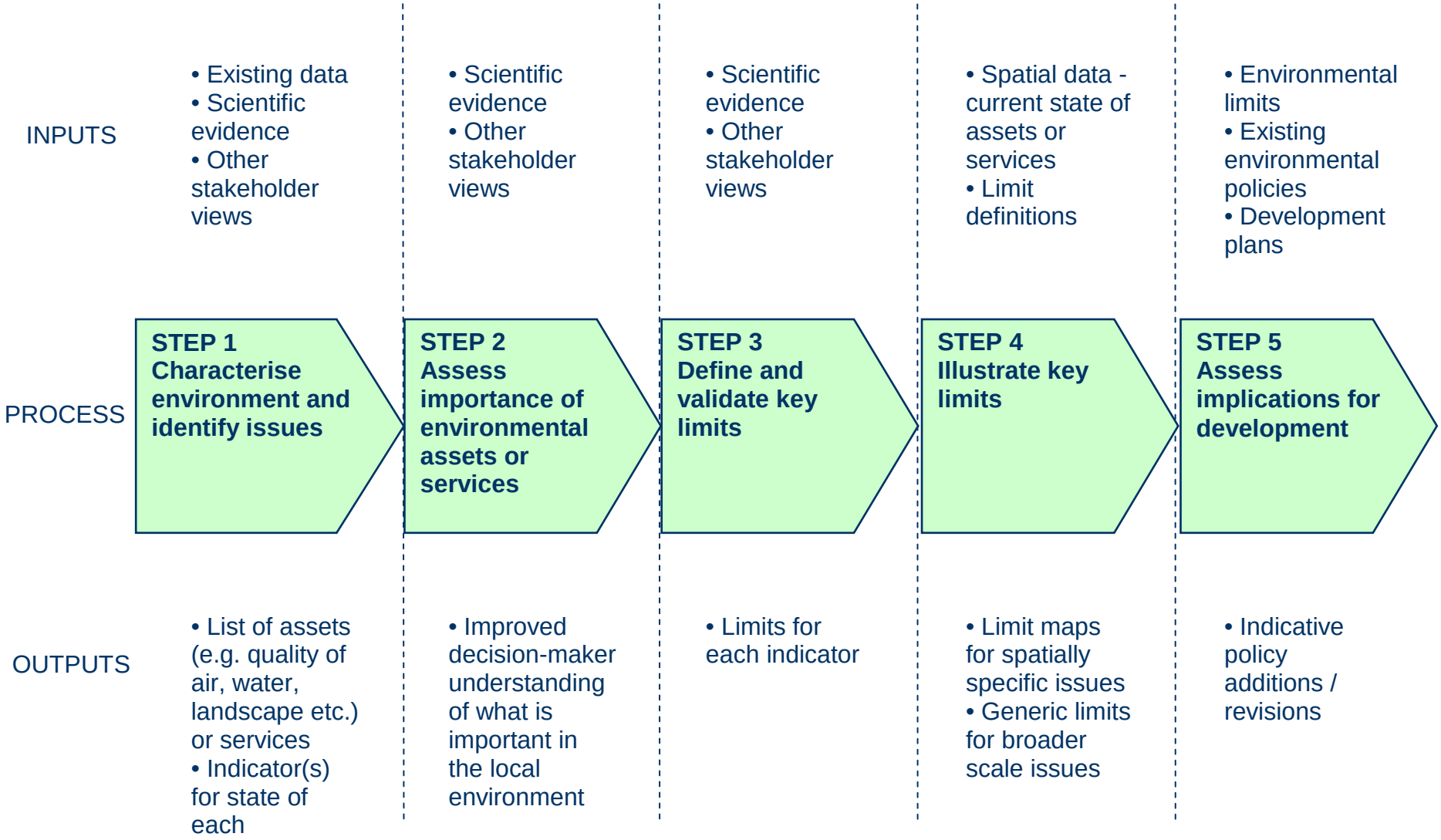
Step 4: Illustrate current state relative to environmental limits

3.24. This step analyses the current state of the environment relative to the defined threshold for each topic at each location and illustrates the results spatially. The output is in the form of a stack of GIS map layers which categorise each 1km x 1km grid square within the study area as acceptable (i.e. threshold met) or unacceptable (i.e. threshold not met) in respect of each environmental topic. Additional spatial environmental information which is available and which provides useful context to the threshold maps can also be overlaid.

Step 5: Assess implications for development

3.25. The final step is to consider the implications of the state of the environment relative to limits (and other environmental information) for sub-regional or regional development policy, in order to afford the environment appropriate protection. Application of the method will not overcome conflicts in planning; it will simply articulate the conflicts better and inform the planning judgments and trade offs that might need to be made.

Figure 3.1 Five step method for applying environmental limits to spatial planning



4. APPLICATION OF THE METHOD IN HAVEN GATEWAY

4.1. The five step method described in **Chapter 3** was applied to Haven Gateway, as far as was possible using available data, in order to test the practicality of the method and suggest further refinements. This Chapter describes the application of the method and **Chapter 5** then highlights potential refinements.

STEP 1: CHARACTERISE ENVIRONMENT AND IDENTIFY ISSUES

4.2. The purpose of Step 1 was to characterise the Haven Gateway's environment and identify related issues. A distinction was drawn firstly between broader scale global issues such as greenhouse gas emissions and issues which are spatially distinct at sub-regional scale such as air quality, water resources and the historic environment.

Broader scale environmental issues

4.3. Two broad scale environmental issues were identified:

- the sustainable level of greenhouse gas (GHG) emissions from human activity; and
- the sustainable level of human consumption of the planet's renewable natural resources.

4.4. The climate is a global scale system and sub-regional changes in GHG emissions are only relevant insofar as they impact this global system. Similarly, although nations or the administrative regions within them may wish to achieve a level of self-sufficiency to assure security of supply or in pursuance of the proximity principle, global trade in food, fibre and other natural resources is a reality and human consumption of these resources must also, therefore, be analysed at a global scale.

4.5. Climate change is a critical consideration for planning in that the scale of its impacts on the environment, and indirectly on economic and social systems, is very large. In Haven Gateway, for instance, the combined impacts of sea level rise and an increased frequency of extreme weather events would lead to widespread flooding of coastal areas while temperature rises and reduced water availability would impact agriculture and biodiversity. Human responses to climate change will also result in significant indirect environmental impacts, for instance the landscape impacts of widespread onshore windfarms and biomass crops.

4.6. The global scale at which both of these capacity constraints act means that, unlike the sub-regional environmental issues considered below, they cannot inform the location of development within the Haven Gateway sub-region or the East of England as a whole, only the amount and type of that development. In other words, the appropriate planning policy response to these broader scale issues is generic rather than spatially-specific at this scale.

Sub-regional environmental issues

4.7. The remainder of the case study therefore focused on the environmental topics for which the method can inform spatially distinct policy responses. These environmental topic areas were:

- Air Quality;
- Water Quality;
- Water Quantity;
- Soils;
- Geology;
- Biodiversity;
- Landscape;
- Tranquillity;
- Open Space;
- Historic Environment.

4.8. A detailed Topic Report was produced for each environmental topic, consistently addressing the following matter:

- The nature and spatial distribution of the environmental assets.
- The 'environmental services' provided by these assets.
- The nature and availability of these services, including opportunities to import, re-create or substitute the services.
- How the services can be measured, including data requirements.

Stakeholder consultation

4.9. Consultation with stakeholders was undertaken, with a total of 30 people from 16 different organisations being consulted. The purpose was twofold: to ensure that the best available data were used and correctly interpreted for each environmental asset; and to elicit stakeholders' views as a proxy for the public's views on the identification of key limits. Many of the consultees possessed a detailed knowledge of the Haven Gateway allowing them not only to provide hard data but also valuable impressions about the features of Haven Gateway's environment that make it special. A list of consultees is provided in **Appendix 2**.

4.10. Since the purpose of the case study was to test and refine the method rather than develop an evidence base for sub-regional planning, the project scope did not extend to sufficiently in-depth consultation to allow the Topic Reports to be validated by key

regional bodies. However, the Steering group members approved the Topic Reports as an appropriate basis for testing the method.

Choice of environmental indicators

4.11. A key output of the characterisation and stakeholder consultation was a set of indicators which could be used to represent the current state of each environmental asset or issue in Haven Gateway using available data. These indicators are shown in the second column of **Table 4.1**.

Table 4.1 Environmental indicators

Asset/ issue	Indicator	Data Source
Air Quality	Air Quality Objectives (AQO) monitoring	Local authorities
Water Quality	River Quality Objectives (RQO) monitoring	Environment Agency
Water Quantity	CAMS water availability status	Environment Agency
Soils	*Not identified*	N/A
Geology	SSSI unit condition	Natural England
Biodiversity	SSSI unit condition	Natural England
Landscape	*Not identified*	N/A
Tranquillity	Intrusion mapping	CPRE
Open Space	Accessible Natural Greenspace standards	Open space strategy
Historic Environment	Grade I and II* listed buildings at risk	English Heritage

4.12. **Appendix 3** provides a detailed description of each dataset chosen as an environmental indicator in the case study. These descriptions identify the research study or ongoing monitoring regimes that provided the data and explore the extent to which the dataset used in the case study can describe the environmental topic area as a whole. As Appendix 3 describes, it is recognised that many of the datasets provide a simplistic and incomplete indication of the current state of the environmental topic area because of the need to restrict the case study to readily available data sources. Given these limitations, it was judged that the use of multiple indicators for each topic would add little to the testing of the method, whilst introducing further complexity. Recommendations on enhancements to environmental data gathering which would help to address the limitations experienced in the case study are set out in **Chapter 5**.

STEP 2: ASSESS IMPORTANCE OF ENVIRONMENTAL ASSETS OR SERVICES

4.13. In attempting to manage changes in the natural and built environment, spatial planners are faced with many trade-offs, both in time (e.g. long term environmental

sustainability v. current housing needs) and space (e.g. allocation of finite land resources between housing, employment, transport, recreation, biodiversity). In order to take proper account of the environment when making these trade-offs, planners need to understand not just what the characteristics of the local environment are (Step 1 of the method) but also their importance (Step 2). This understanding comes both from a generic appreciation of the benefits or services that each environmental asset provides and from an understanding of the importance of those services relative to one another in the local context.

Importance of broader scale environmental issues

4.14. Greenhouse gas emissions and sustainable consumption and production are of fundamental importance because a failure to respect either of them ultimately threatens human survival. Scientists now have a high level of confidence that unmitigated climate change impacts over this century will include:

- an increase in the extent of drought affected areas;
- ecosystem changes with predominantly negative consequences for biodiversity, and ecosystem goods and services;
- reduced crop production due to flooding and drought, especially in subsistence sectors at low latitudes;
- adverse effects on aquaculture and fisheries;
- increased threats to survival, health, food and fresh water supply and livelihoods due to extreme climate events, flooding and erosion for coastal and low-lying settlements[22].

4.15. In relation to the consumption of the planet's renewable biological resources, it is self-evident that consumption patterns which exceed the capacity of these resources to renew themselves cannot be sustained in the long term without threatening our existing way of life.

4.16. Unlike sub-regional and local issues, however, the broader scale issues require a generic (i.e. not spatially specific at the regional scale) response.

Importance of sub-regional environmental topics

4.17. The environmental services functions outlined in **Chapter 3** provide a useful framework for analysing the benefits that environmental assets can provide. **Table 4.2** sets out the range of environmental services provided by the in the Haven Gateway Topic Reports. Identifying these services during application of the environmental limits method helps to ensure that they are not overlooked by the decision maker when weighing environmental issues against social or economic ones.

[22] IPCC (2007) *Climate Change 2007: Impacts, Adaptation and Vulnerability Working Group II Contribution to the Intergovernmental Panel on Climate Change Fourth Assessment Report.*

Table 4.2 Environmental assets and their services in Haven Gateway

Environmental Topic	Service provision: Supporting	Service provision: Provisioning	Service provision: Regulating	Service provision: Cultural
Air	Air to breathe required for life and good health	Ozone can damage crop yields; acid deposition can harm freshwater fisheries	Air quality – pollution can disrupt ecosystem functioning	Air quality – pollution can adversely affect our perception and enjoyment of the environment
Water	Water for the environment; waste treatment	Drinking water; irrigation	-	Recreation & aesthetic benefits
Soil	Biomass - food, timber, fibre and biofuel production	Platform for development and recreation	Above and below ground biodiversity	Industrial minerals; archaeology; heritage.
Geology	Biomass - food, timber, fibre and biofuel production Platform for development and recreation	Above and below ground biodiversity Industrial minerals Groundwater aquifers Fossil fuels Geothermal energy	Water quality and supply Atmospheric quality (GHGs)	Heritage protection Earth science education
Land based flora and fauna	Ecosystem resilience; ecosystem stability through diversity	Commercial crops e.g. reed beds, energy crops	Climatic control e.g. via evapo-transpiration; flood regulation	Aesthetic pleasure; creation of safe/ harmonious environments; health benefits e.g. 'green gyms'; recreation & tourism
Marine based flora and fauna	Ecosystem resilience; ecosystem stability through diversity	Food e.g. fish stocks; raw materials	Health benefits of marine recreation; climate control via biogeochemical cycling & carbon sequestration; flood control e.g. by salt marshes	Learning opportunities; aesthetic pleasure; recreation.
Landscape	-	-	-	Sense of place and belonging; tranquillity; aesthetic pleasure; education
Open space	-	-	Flood regulation, pollution control and local climatic amelioration	Physical and mental wellbeing
Historic Environment	Substrate for biodiversity; determination of species assemblage	-		Sense of place/ community identity; aesthetic pleasure; education; religion; recreation

4.18. The table shows that all of the functions provided by landscapes are 'cultural', while the functions of soil and geology are predominantly 'provisioning' and 'regulation'. Different stakeholders will have different views on the relative importance of individual services provided under these four functional groups which makes it difficult to assess their relative importance objectively. Nonetheless, it is clear that unlike a number of services falling under the Supporting, Provisioning and Regulating headings, those fulfilling a Cultural function do not directly contribute to human survival. The relative importance of different environmental assets, could thus be based on some combination of the number and type of services they provide.

4.19. This generic analysis provides some information on the relative importance of environmental topics and the services they provide - those which are critical to food production would generally be considered more important than those contributing to sense of place, for example. Relative importance will also differ from one location to another, however. Gaining an understanding of this local differentiation is not straightforward and is an area for further study. The case study attempted to gather clues to relative importance in Haven Gateway by considering in some detail the nature and availability of the services provided by the environmental assets. If a service is important generically, that importance is enhanced in the local context if it is locally rare, irreplaceable and not substitutable. This was the case for most of the services considered, the main exceptions being those replaced by natural regenerative processes, for example air from photosynthesis of plants or soil formation from organic and inorganic processes. Such processes are, however, generally slow acting and themselves require intact ecosystems.

4.20. An additional technique used in the case study was simply to ask stakeholders for their perception of what makes the Haven Gateway's environment special. Although based on responses from a small stakeholder group in the case study, this kind of technique can be useful in providing a 'big picture' of local environmental priorities, especially those which provide a cultural service and are typically less amenable to monitoring. The perceived special features of Haven Gateway included:

- wide expanses of countryside and huge sweeping skies;
- a sense of remoteness and tranquillity, particularly in the less accessible parts of the coast;
- magnificent churches which can be seen for miles around;
- fabulous gardens and stately homes;
- pastel-washed cottages and Tudor houses;
- narrow country lanes, leading to market squares;
- magnificent timber-framed houses and village greens;
- remote and beautiful coastline, studded with tiny unspoilt fishing villages;
- idyllic riverside meadows and landscapes;

- strong sense of place but a lack of overall cultural identity;
- 'England's best kept secret'.

4.21. While the techniques used during the case study to provide an indication of relative importance were simplistic, more rigorous tools could be used to address the same questions in future applications of the method, provided that sufficient resources and suitable data are available. Two such tools are the Quality of Life Assessment approach and environmental valuation.

Quality of Life Assessment Approach

4.22. A variety of techniques have been used in the context of planning to assess the relative importance of environmental issues, for example focus groups, stakeholder workshops or non-market valuation techniques[23]. In England, the most widely accepted of these is probably the Quality of Life (QoL) Assessment Approach[24]. The approach was developed by the statutory environmental bodies as a tool for identifying '*what matters and why*' in plan-making processes and in development control. In terms of the environment it allows all aspects of the environment, from the built environment to wildlife, to be looked at in the same systematic and transparent way. It also allows the concerns of local people to be seen alongside those of professionals, leading to more informed decisions. The QoL Assessment website[25] provides useful recommendations and case studies on methods that can be used to consult the public on local environmental issues.

4.23. The methodology required to carry out a QoL Assessment has a number of features in common with that put forward in this report to examine environmental limits. The approach could, in particular, be used in assessing the relative importance of the benefits/services provided by environmental aspects (air quality, water resources, landscape etc.). However, an important limitation of the QoL approach as far as its application to environmental capacity is concerned is its reliance on consideration of the benefits and services of environmental assets, rather than the assets themselves since, as noted earlier, data on the provision of services are in short supply. This was borne out by the pilot QoL Capital studies which noted that the approach '*can entail considerable costs and staff time to obtain the necessary information*' and that the '*lack of defined targets and hard information on trends can mean the only alternative is 'subjective judgement' about whether we expect to have enough…benefits*'. Complexity of the approach was also a concern with some pilots generating '*too much detailed and confusing information*'.[26] This may explain the rather limited uptake of the QoL Capital approach by planners since its development in the late 1990s.

Environmental Valuation

4.24. As previously stated, planning decisions that impact environmental assets and the services they provide will often involve trade-offs between these services and a

[23] Methods that calculate an express or implied willingness to pay for environmental benefits
[24] http://www.countryside.gov.uk/LAR/archive/Quality/toolkit.asp
[25] http://www.countryside.gov.uk/Images/public_participation_tcm2-8899.pdf
[26] Countryside Agency (no date) Case Studies of the Application of the QoL Assessment Approach. Available from: http://www.countryside.gov.uk/LAR/archive/Quality/Contacts_reports/reports.asp

method for choosing between different planning options with different environmental impacts is needed. An alternate approach to QoL Assessment is environmental valuation. This is the application to environmental decision-making of cost-benefit analysis, an established policy analysis framework which aims to quantify in monetary terms, the costs and benefits to all members of society of different policy options. In the context of an environmental limits approach, environmental valuation could be used to place a monetary value on the changes in environmental services that are expected from different spatial planning choices. The process of placing a monetary value on all environmental impacts provides a common currency which acts as a proxy for the impact on human wellbeing and which therefore provides a consistent framework for evaluating the choices available against one another. This application of environmental valuation is proposed as part of Defra's Ecosystems Approach.

4.25. Environmental valuation requires calculation of the total economic value of the changes in ecosystem services expected to result from each decision. While a few ecosystem services can be readily valued using market values (e.g. changes in crop production), most are not traded on markets and require non-market valuation techniques. Broadly, these non-market techniques either look at people's intended behaviour in hypothetical markets (e.g. surveys that elicit willingness to pay for an environmental service/benefit) or at people's actual, past behaviour in related markets (e.g. looking at the travel costs and time that people invest in visiting an environmental feature as a proxy for the value they place on being able to access it).

4.26. If environmental valuation of ecosystem services can be performed, it could bring a variety of benefits, notably a rational and transparent process for assessing relative importance, a means of integrating impacts on widely differing aspects of the environment and ensuring that all of the environment's impacts on human wellbeing are captured. Practical application of the approach will present significant challenges however. Foremost amongst these is that the complexity of interacting processes within ecosystems means that quantifying the changes in ecosystem services that are likely to result from a policy action makes huge demands on scientific understanding and resources for analysis. Applying appropriate monetary values to assumed changes in ecosystem services can also be problematic when the nature of those changes or their wider consequences are subject to a high level of uncertainty or may be irreversible.[27]

Weighting environmental topics

4.27. Since decision makers will attach more importance to some aspects of the environment than others, this could potentially be made explicit by attaching different weightings to the various environmental limits analysis layers that comprise the GIS tool used to illustrate key environmental limits (Step 4). These differential weights would then be reflected in the composite view of the current state of the environment relative to limits. While weightings were not used in the case study, the method does incorporate the facility for such a weighting system within the interactive GIS tool. In addition, the ability to assess the overall effect of applying different weightings to the individual environmental assets allows sensitivity analysis

[27] Defra (2007) An introductory guide to valuing ecosystem services.

to be conducted, illustrating the changes to the consolidated limits analysis that result when the relative weight of one is incrementally changed.

STEP 3: DEFINE AND VALIDATE KEY ENVIRONMENTAL LIMITS

4.28. Drawing on the information gathered in Step 1, including the views of expert stakeholders and the project steering group, the limits shown in **Table 4.3** were selected.

Table 4.3 Environmental topics, indicators and limits

Topic	Indicator	Within Environmental Limit	Environmental Limit Exceeded
Air Quality	Air Quality Objectives (AQO) monitoring	AQO met/ expected to be met in area	AQO not met/ not expected to be met in area
Water Quality	River Quality Objectives (RQO) monitoring	River stretch achieves overall 'Pass' v. RQOs	River stretch achieves overall 'Fail' v. RQOs
Water Quantity	CAMS water availability status	CAMS assessment is 'Water Available' or 'No Water Available'	CAMS assessment is 'Over-licensed' or 'Over-abstracted'
Soils	*Not identified*	N/A	N/A
Geology	SSSI unit condition	SSSI assessed as having 'Favourable' status	SSSI assessed as having 'Unfavourable recovering', 'Unfavourable no change', 'Unfavourable declining', 'Part destroyed' or 'Destroyed' status
Biodiversity	SSSI unit condition	SSSI assessed as having 'Favourable' status	SSSI assessed as having 'Unfavourable recovering', 'Unfavourable no change', 'Unfavourable declining', 'Part destroyed' or 'Destroyed' status
Landscape	*Not identified*	N/A	N/A
Tranquillity	Intrusion mapping	Area unaffected by noise or visual disturbance	Area affected by noise or visual disturbance
Open Space	Accessible Natural Greenspace standards	Area within catchment of any category of ANG	Area not within catchment of any category of ANG
Historic Environment	Grade I and II* listed buildings at risk	Listed building does not appear on English Heritage 'Buildings At Risk Register'	Listed building appears on English Heritage 'Buildings At Risk Register'

4.29. These were then used as the basis against which to assess the current state of each environmental topic in Haven Gateway. More detailed information on the threshold definitions and the assessment of the current state of the environment relative to those limits is provided in **Appendix 3**. This appendix also describes the limitations of the chosen limits. In some instances, for example presence of Buildings at Risk to represent a limit value for the historic environment, the limit value was accepted by stakeholders on the basis that some means of representing the asset in the tool was better than none, despite the limit not being strongly representative of the broader environmental asset.

4.30. Where no indicator and/or limit could be defined for a particular environmental topic, available spatial information relevant to an understanding of that aspect of the environment was included in the GIS tool as an information layer. For example, although no data were available to assess soil condition against an agreed threshold, a layer was provided illustrating the location of the different soil types, in the form of the National Soil Resources Institute's 'Soilscape Units'. Despite the lack of environmental data in a form suitable to determine current state relative to limits, these information layers provide useful further context for spatial planning and are reproduced in **Appendix 4**.

STEP 4: ILLUSTRATE CURRENT STATE RELATIVE TO LIMITS

4.31. Having researched and defined the indicators and limits shown in **Table 4.1**, the current state of the environment in relation to the limit was illustrated on a series of GIS maps of Haven Gateway. The spatial patterns revealed by this mapping exercise are described below. The findings regarding each environmental topic should be considered in light of the limitations of the corresponding indicator data which are discussed at length in **Appendix 3**, with suggestions for data improvements made in **Chapter 5**.

Air quality

4.32. The Local Air Quality Management (LAQM) assessment reports reveal that in most parts of the Haven Gateway, Air Quality Objectives (AQO) are expected to be met for all seven of the prescribed pollutants. The exceptions to this are described below and illustrated in **Figure 4.1**.

Suffolk Coastal

4.33. The first round of LAQM assessment in Suffolk Coastal district concluded in 2001 that AQOs would be met for all seven pollutants. In the second assessment round, the Update and Screening Assessment (2003) and subsequent Detailed Assessment (2004), concluded that for nitrogen dioxide, sulphur dioxide and particulate matter (PM10) further investigation was necessary at Woodbridge Junction in Woodbridge and for activities on and associated with the Port of Felixstowe. The latest round of assessment concluded as follows:

- Woodbridge - An AQMA was declared in respect of nitrogen dioxide for Woodbridge Junction in Apr-2006 and Further Assessment is being undertaken;

- Felixstowe - The 2006 Updating and Screening Assessment concluded that there was a risk of AQOs being exceeded for nitrogen dioxide, sulphur dioxide and particulate matter due to activities on and associated with the Port of Felixstowe and a Detailed Assessment was ordered.

Ipswich

4.34. The Borough's 2003 Updating and Screening Assessment called for Detailed Assessment in respect of nitrogen dioxide and particulate matter. More detailed assessment reported in the 2005 Progress Report concluded that the annual mean nitrogen dioxide objective will be exceeded along the roads studied in 2005 and recommended declaration of an AQMA. Three AQMAs were declared in Ipswich in 2006 in respect of nitrogen dioxide.

Babergh

4.35. The 1993 and 2003 assessment rounds both concluded that AQOs were likely to be achieved in the district, as did the USA published in April 2006. The latest Progress Report has concluded as follows:

- Sudbury - The diffusion tube monitoring programme reported in the 2006 Annual Progress Report (published May 2007) showed nitrogen dioxide concentrations at or above AQO levels at two locations in Sudbury which will be subject to additional monitoring.

Colchester

4.36. The first round of assessment in 2000 led to declaration of an AQMA for nitrogen dioxide at Mersea Rd, Colchester, which still remains in force. 2003 and 2004 assessments identified 3 other areas at risk of exceeding the nitrogen dioxide AQO but following Detailed Assessment it was concluded in 2005 that only one of these, Brook St, should be declared an AQMA. The latest (2006) Updating and Screening Assessment has concluded as follows:

- There is a risk of the annual mean nitrogen dioxide objective being exceeded at 21 monitoring locations in the borough and Detailed Assessments have been ordered, most within the town of Colchester plus 3 sites at Marks Tey; the two existing AQMAs remain in force.

Water quality

4.37. The RE classification data obtained from the Environment Agency were gathered during the period 2004-2006. No trend data were examined.

4.38. The RE data showed a noticeable split between performance against objectives for the north east of the Haven Gateway versus performance in the south west of the sub-region. South west of a line joining Ipswich and Harwich, the majority of river stretches passed RQOs (water quality shown as acceptable in **Figure 4.2**) whilst north east of this line, most stretches marginally or significantly failed to achieve RQOs. This is somewhat surprising, given that the part of the sub-region achieving more 'Pass' classifications is more densely populated and developed than the north

east area of the Suffolk Coast and Heaths. This highlights the fact that target RQO scores depend on the designated uses of the river stretch in question. Examination of RQO target values shows that river stretches in the north east of the Haven Gateway generally have more stringent RQO targets, presumably because this area has, in general, a higher amenity value.

4.39. Of the various chemical criteria contributing to achievement of the target RE class for a stretch of river, the one most common cause of failure in Haven Gateway was dissolved O_2 which is vital to support aquatic life. Discussion with a member of the Environment Agency area water quality team suggested that the relatively low dissolved O_2 concentration in the sub-region's rivers is, in part, a reflection of the topography of the East of England. The flat landscape gives rise to relatively low, slow-flowing rivers which provide less opportunity for dissolution of O_2 from the air than turbulent, faster flowing rivers. Low dissolved O_2 can also result from the input of large quantities of organic matter, such as agricultural runoff or sewage effluent, which consume O_2 during their decomposition. The presence of undesirable quantities of organic matter is highlighted by a high BOD and this was the second most common RQO criteria not achieving a pass standard. A full list of RQO performance against the various chemical indicators for rivers having an assessed stretch within the Haven Gateway is provided in **Appendix 3**.

Water quantity

4.40. As **Figure 4.3** illustrates, many of the WRMUs in the Haven Gateway have an unacceptable water resource availability status, including those surrounding the settlements of Ipswich, Colchester and Felixstowe. The current state of water resources is acceptable in a number of WRMUs along the western edge of the sub-region, as well as the River Yox WRMU in the vicinity of Sizewell power station in the north and the Tenpenny WRMU to the east of Colchester. Some spatial correlation is apparent between attainment of the surface water resource threshold and the water quality threshold, reflecting the fact that water quality in over-abstracted rivers can be impacted by the reduced potential for dilution of pollutants.

4.41. Turning to groundwater resources, **Figure 4.4** shows that the Confined Chalk GWMUs underlying East Suffolk and North Essex have an unacceptable water resource availability (over-abstracted CAMS status), as do all three of the Coastal Crag GWMUs of the East Suffolk CAMS.

Soils

4.42. The earlier steps of the methodology were unable to identify a suitable spatial dataset to portray the current state of soils in the Haven Gateway or a suitable basis for setting an environmental limit. Characterisation of the different soil types within Haven Gateway was included in the GIS tool as an information layer (see **Appendix 4**). However, while this describes the nature of soils present at different locations, no comprehensive dataset exists which assesses the current state of those soils. Indeed, there is an on-going debate as to the environmental indicators that are best

used to assess the capacity of a soil to provide ecosystem services.[28,29,30] Recommendations on the data improvements required to allow inclusion of soils in the environmental limits methodology are included in **Chapter 5**. A discussion of the ecosystem services provided by soils and a table showing indirect indicators which might in the future be used to assess the state of service provision can be found in the Stage 1 Topic Reports.

Geology

4.43. **Figure 4.5** shows the location of the Haven Gateway's earth heritage SSSIs. SSSIs are split into separate management units, the condition of each being separately assessed. Of the Haven Gateway's 44 earth heritage SSSI units, 39 (89%) meet the threshold for acceptable condition (Natural England 'favourable' assessment) while the remaining 5 (11%) do not.

4.44. The reason for these SSSI units not being in favourable condition was that the earth heritage features were obstructed due, for example, to inappropriate control of scrub and water levels (Wivenhoe Gravel Pit) or fly tipping (St Osyth Pit).

Land-based flora and fauna

4.45. SSSIs are split into separate management units, the condition of each being separately assessed. Of the Haven Gateway's 366 biodiversity SSSI units, 193 (53%) meet the threshold for acceptable condition (Natural England 'favourable' assessment) while the remaining 173 (47%) do not.

4.46. As **Figure 4.6** shows, some of the larger groupings of SSSI units not currently meeting an acceptable threshold are located around the estuaries of the Colne, Stour, Deben and Alde-Ore as well as Hamford Water. The most commonly cited issue is erosion of salt marsh due to coastal squeeze (plus possible contributions from recreation and dredging), with water pollution due to agricultural run-off another common problem. The East of England Biodiversity Mapping Project[31] developed a regional biodiversity network map for the East of England region. The project identified the region's coastal areas as Core Biodiversity Areas, so it is concerning that a large amount of coastal land assessed was scored as unacceptable.

4.47. The units within the Sutton and Hollesley Heaths SSSI to the south of Rendlesham Forest also fail to meet favourable condition, usually due to inappropriate scrub control, although a number of these are now recovering.

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[28] Loveland, P.J. and Thompson, T.R.E. (2001) (Eds) Identification and development of a set of national indicators of soil quality. Environment Agency R&D Technical report P5-053/2/TR. Environment Agency, Bristol.

[29] Environment Agency (2006) The development and use of soil quality indicators for assessing the role of soil in environmental interactions. Science Report SC30265. Environment Agency, Bristol

[30] Emmett, B.A et al SNIFFER LQ09 (2006) SNIFFER National Sopil Monitoring Network: Review and Assessment Study. SNIFFER, Edinburgh.

[31] Land Use Consultants and Terra Consult for East of England Biodiversity Forum (2005) East of England Biodiversity Mapping Project

Landscape

4.48. The earlier steps of the methodology were unable to identify a suitable spatial dataset to portray the current state of landscapes in the Haven Gateway or a suitable basis for setting an environmental limit. Characterisation of the different landscapes types within Haven Gateway was included in the GIS tool as an information layer, as were the locations of landscape designations (see **Appendix 4**). However, while this describes the character of landscape present at different locations, no comprehensive dataset exists which assesses the current state of those landscape character areas. Recommendations on the data improvements required to allow inclusion of landscape in the environmental limits methodology are included in **Chapter 5**. A discussion of the ecosystem services provided by landscape and a table showing data sets which provide some measure of the character and value of the landscape be found in the Stage 1 Topic Reports.

Tranquillity

4.49. Tracking the changes over time reveals marked increases in the proportion of land area classed as disturbed, both in England as a whole and within the Haven Gateway as **Table 4.4** illustrates.

Table 4.4 Proportion of land area disturbed by visual and noise intrusion

	Early 1960s	Early 1990s	2007	Increase 1960s - 2007
England[32]	26%	41%	50%	24%
Haven Gateway[33]	32%	48%	57%	25%

4.50. The main areas of noise and visual disturbance in **Figure 4.7** are the major settlements of Ipswich and Colchester, lesser settlements such as Felixstowe, Harwich, Clacton-on-Sea and the transport corridors that connect them to each other and to the strategic transport network, including the A12 and A14. Nevertheless, the sub-region retains significant areas of tranquillity, notably most of that part of the Suffolk Coast and Heaths AONB lying within Haven Gateway; the western part of the Dedham Vale AONB; an area to the south of Colchester and west of the Colne estuary; and an area to the north east of Ipswich and west of the A12. This relative tranquillity is borne out by comparison to neighbouring Chelmsford District (72% disturbed) or built up areas of the south coast of Hampshire (Havant and Fareham local authority areas are both 100% disturbed).

Open space

4.51. **Figure 4.8** illustrates that the majority of Haven Gateway falls within the catchment area of one of the different categories of ANG defined in the sub-region's draft Open Space Strategy. The main area deficient in access to ANG is seen to be a broad band

[32] CPRE (2007) Op. Cit.
[33] LUC analysis

running between Colchester and Ipswich and spreading along the border of Haven Gateway to the north and east of Ipswich.

Historic environment

4.52. The red cells in **Figure 4.9** indicate the 1km grid squares containing one or more Grade I or II* listed building which are on the English Heritage Buildings at Risk Register. Of 485 Grade I or II* listed buildings in Haven Gateway, only 19 are identified as being at risk by the English Heritage EH Register. However, as noted in **Appendix 3**, this is as much a reflection of the incompleteness of this particular dataset as it is of the good condition of the historic assets. A number of the cells containing Buildings at Risk are located in the intensively developed settlements of Haven Gateway, for example Ipswich has a very dense concentration of medieval parish churches. The interactive GIS tool can be used to identify the particular buildings and comments on their condition from the Register and some examples are shown in **Table 4.5**.

Table 4.5 Illustrative data from the historic environment limits map

Location of 1km cell where limit breached	Building at risk within cell	Comments from Buildings at Risk Register
Colchester	The Benedictine Abbey of St John Listed grade II* LB No. 116859	Poor condition, Priority D: Slow decay; solution agreed but not yet implemented
Ipswich	Church of St Peter Listed grade II* LB No. 275413	Fair condition, Priority F: Repair scheme in progress and (where applicable) end use or user identified; functionally redundant buildings with new use agreed but not yet implemented
Harwich	Electric Palace Cinema Listed grade II* LB No. 366562	Poor condition, Priority B: Immediate risk of further rapid deterioration or loss of fabric; solution agreed but not yet implemented

4.53. Buildings at Risk also appear in more rural locations however, such as Bawdsley Manor, a transmitter block and two Martello Towers on the Suffolk coast between Felixstowe and Hollesley. Martello towers are a nationally significant resource characteristic of the Suffolk/Essex coast. Cinemas also represent a category of historic building often at risk as a result of changing demands including development of out of town multiplexes, a planning related problem.

4.54. The limitations of the BAR dataset as an indicator of the state of the wider historic environment are discussed in **Appendix 3**. **Chapter 5** sets out how a character based approach to the historic environment is needed to help define strategic historic environment issues better.

Composite view

4.55. In addition to the maps illustrating the state of individual environmental topics relative to limits, a composite map was also produced (see **Figure 4.10**). This limits map was generated by looking across all environmental topics and adding together the number of times a limit was breached in each grid square. The resulting composite view serves to highlight locations of greatest environmental stress and thus provides a route into the underlying information on individual environmental topics. In its interactive form, this map allows the user to easily identify which environmental limits have been breached in any particular 1km square.

STEP 5: ASSESS IMPLICATIONS FOR DEVELOPMENT

4.56. This study focused on developing an environmental limits method which utilises existing data sets and on refining the method through its application in Haven Gateway. The absence of sufficient data to fully assess the current state of some aspects of the environment, coupled with the limited stakeholder involvement in setting limits, mean that the findings of the Haven Gateway case study are insufficiently robust to support planning policy decisions. Recommendations on the data gaps that need to be filled are set out in **Chapter 5** of this report. Nevertheless, this section considers indicative spatial planning implications for Haven Gateway in order to illustrate the general directions of policy development that a full use of the methodology could support.

Indicative policy implications of the Haven Gateway environmental limits analysis

Air quality

4.57. The air quality threshold map indicates that areas of unacceptable air quality exist in Ipswich, Colchester, Felixstowe and Woodbridge. The concentration of air quality problems in such major settlements and commercial hubs is unsurprising but is nevertheless a cause for concern, particularly when Government policy seeks to direct new development towards existing urban centres. The presence of unacceptable air quality/AQMAs does not, however, mean that new development should be avoided in these locations but rather be a prompt for further consideration of the issue. New development close to public transport hubs or employment locations, for example, can help to reduce road traffic emissions by reducing the need for private car journeys. More intensive pollution monitoring at such locations may also be appropriate, perhaps funded by developer contributions.

Water quality

4.58. A preliminary review of the impact of human activity on water bodies within the Anglian River Basin District showed that most rivers and ground waters in the Haven Gateway are 'At Risk' of not meeting Water Framework Directive requirements due to one or a combination of point source pollution, diffuse pollution, abstraction or flow regulation measures. This is borne out in part by the water quality threshold map (Figure 2.2) which shows that River Quality Objectives are not being met in a number of river stretches within the Haven Gateway and that an environmental limit

has therefore been breached. Looking behind the overall RQO compliance data revealed that low dissolved oxygen and high biochemical oxygen demand were the most common reasons for failure. A variety of natural and anthropogenic factors can be responsible for these river water conditions, and expert advice should be sought to understand the most significant drivers of poor quality at any particular location. For example, sewage effluent can result in these water quality issues and any plans for major development upstream of river stretches suffering from low dissolved oxygen and high BOD would therefore need to be mindful of the need to ensure that sufficient sewage treatment capacity is provided in advance of such development.

Water resources

4.59. As already mentioned in the preceding paragraph, preliminary River Basin Characterisation in preparation for WFD implementation indicates serious concerns for water resources in the Anglian River Basin. This is in agreement with the CAMS water resource availability data examined in this study which showed that if all current abstraction licences were used to their full extent, unacceptable environmental damage would be caused to many of the sub-region's rivers. The clear message for those planning further development is that water is a scarce resource in the Haven Gateway. Since acceptable levels of abstraction licensing have already been reached or exceed in many WRMUs, it will be essential that planners work closely with water companies and the Environment Agency to determine spare capacity within existing licences as well as taking every opportunity to promote efficiency of water consumption, for example by requiring stringent resource efficiency standards to be met in new housing developments.

Soils

4.60. No environmental limit could be defined, as described under Step 4.

Geology

4.61. Most earth heritage SSSIs were in acceptable condition while the features of a few remaining ones were obscured. Indirect impacts of development on the condition of designated sites are rather less likely than they are for biodiversity sites. The main considerations for spatial planning will be to avoid development which directly damages or obscures designated sites or which reduces their accessibility.

Land-based flora and fauna

4.62. The condition assessments for designated biodiversity sites which have been presented in this study can do little, in isolation, to inform spatial planning. Instead, they should prompt planners to investigate the factors required to maintain or enhance a site already in favourable condition or to restore one not currently meeting the conservation objectives for which it was designated. For instance, if site integrity depends on low levels of human disturbance but development is likely to increase recreational use of that site, this may suggest planning measures such as exclusion of residential development within a certain travel distance of the site and the need for additional accessible greenspace to be provided in parallel with housing growth.

4.63. In the case of the Haven Gateway, a frequent cause of unacceptable condition was erosion of coastal habitats such as salt marsh due to coastal squeeze. This clearly has implications for the location of new development, in that locations requiring hard coastal defences should be avoided where possible. Integrated planning between the various stakeholders of coastal management will help to identify such locations as well as those where development should be avoided due to planned coastal re-alignment. Such re-alignment schemes themselves offer the opportunity for recreation of coastal habitats which cannot be protected on other parts of the sub-region's coastline.

4.64. The factors required to maintain integrity of a SSSI can be obtained from Natural England's website which provides 'Views About Management' for every site. Although these factors could potentially be summarized and linked into the environmental capacity tool, the additional convenience does not justify the time required to transcribe and maintain these data.

Marine-based flora and fauna

4.65. No environmental limit was defined other than for coastal and estuarine designated sites which are included in the discussion of land-based flora and fauna.

Landscape

4.66. No environmental limit could be defined, as described under Step 4.

Open space

4.67. With the Suffolk Coast and Heaths and Dedham Vale AONBs covering a significant proportion of its land area, and its relatively undeveloped estuaries and coast, Haven Gateway would on the face of it appear to have an excellent provision of open space. However, data gathered by The Landscape Partnership for the Haven Gateway Partnership showed that access to green spaces which have an element of management for biodiversity is very patchy. Although almost half of the sub-region's land area has access to at least one of the different size categories of Accessible Natural Greenspace (ANG), virtually none of it has access to sites within all the size categories defined by the standards in the emerging greenspace strategy. A high level examination suggests that more Local Sites are needed in and around all population centres and that the sub-region would also benefit from at least one new Regional Site which provided access to an ANG site of more than 500 ha to the central part of the sub-region. The new ANG strategy will provide detailed guidance on this topic.

Historic environment

4.68. As noted in **Appendix 3**, the English Heritage Buildings at Risk data provides a very limited indication of the overall state of the historic environment in Haven Gateway. Nevertheless, ready access by planners to information on the location, identity and condition of these structures may indicate locations where development will need to take particular care to preserve historic buildings, their settings and other historic assets. It may suggest opportunities to bring at-risk buildings back into use through appropriate development and planning conditions, for the mutual benefit of the development and the historic building in question. Wider data sets on Heritage at

Risk will be available at the county Historic Environment Record Centres during the next year, some of which will be accessible on-line.

Pressures and policy responses

4.69. Having considered the environmental baseline relative to limits and indicative policy implications, this section considers the pressures (including climate change) which may alter the current condition of environmental assets within the Haven Gateway. **Table 4.6** describes underlying pressures on the environment and those created by the development proposals within the East of England Plan[34], thereby suggesting the likely future evolution of the current state of the environment. To this picture is added the current policy response in the form of mitigation measures embodied within the RSS. This approach facilitates analysis of the extent to which current policies are likely to ensure that the pressures are controlled sufficiently to ensure that environmental limits are not breached.

4.70. The environmental limits approach adds to the framework currently provided by SEA/SA by considering the current state of the environment relative to limits alongside pressures on those environmental assets and current policies to mitigate those pressures. Although it is not possible to assess exactly whether the identified pressures will result in an adverse change in any given grid square in Haven Gateway, the approach will assist regional scale spatial planning by:

- Providing defined limits against which to judge the significance of the effects of development and other pressures on the environment;
- Helping to identify policy gaps that should be addressed at sub-regional level;
- Suggesting relative priorities for new and existing mitigation policies.

4.71. No attempt was made to illustrate spatially development pressures of the kind identified in **Table 4.6**, given the general nature of much of the policy within regional-level strategies. The logical next step in applying an environmental limits approach to planning within the region, however, is to overlay more spatially specific development proposals with environmental capacity maps to help to identify the most appropriate locations for them. At this stage, the particular environmental assets or services in greatest danger of being pushed beyond acceptable limits by the proposed development can be more readily identified. This in turn will suggest not just where development should be located but what sustainable design features should be specified within sub-regional development plans in order to mitigate most effectively the pressure points identified.

[34] GO-East (Dec 2006) East of England Plan: The Secretary of State's Proposed Changes

Table 4.6: Current state, pressures and mitigating policy responses

Current state relative to limit	**Pressures**	**Mitigating RSS policies** (Proposed Changes version)
Air quality		
Acceptable except at: • Woodbridge; • Felixstowe; • Ipswich; • Sudbury; • Colchester. Basis of 'acceptable' limit: Air Quality Objectives met/expected to be met for 7 prescribed pollutants.	National trends for increasing car ownership per household[35], coupled with projected growth in number of households in East of England[36] (population growth; reducing household size). Road, rail and shipping emissions associated with development of port, freight handling facilities and strengthening of transport links with Thames Gateway, Stansted Airport, Cambridge and the Midlands. (e.g. T6: Improve strategic and regional road networks; T10: Adequate freight capacity to ports; T11: Enhanced access to ports; T12: Enhanced access to airports) Energy generation emissions to support increased number of households, workplaces and associated infrastructure such as water supply, wastewater treatment and waste processing. Dust and vehicle emissions generated by large scale construction activity. Climate change - Elevated summer air temperatures and increased sunshine can increase the rate of formation of secondary pollutants such as ground level ozone. Climate change – Reduced summer rainfall will lead to drying of the soil and may increase atmospheric dust.	T2: Basket of measures to bring about greater use of sustainable modes of transport e.g. encourage workplace travel plans; invest in tele-working. T3: Road pricing or other demand management for highway use to tackle congestion. T4: Bring about shift away from car use in urban areas e.g. by ensuring major developments have safe, well designed pedestrian and cycle routes and a high standard of public transport. T5: Improve inter-urban public transport through e.g. improved sustainable access to mainline rail stations; high quality interurban bus services; strategic Park and Ride. T7: Sustainable access from rural settlements to key service centres. T9: Improved provision for walking and cycling. T10: Increase proportion of freight carried on rail and by water (N.B. caveat 'where those are most efficient modes'). T13: Improved public transport provision. ENV7: New development should reduce pollution and maximise access by a choice of travel modes. ENG1 & ENG2: Policies to increase the proportion of energy supplied from renewable sources will generally benefit air quality in addition to GHG emissions.
Water quality		

[35] Average cars per household increased from 0.82 to 1.15 1985/6 – 2006 per National Travel Survey 2006, Department for Transport

[36] CLG (Mar 2007) 2004-Based Household Projections - predict region's households to grow from 2.3M in 2004 to 2.9M in 2026

Current state relative to limit	**Pressures**	**Mitigating RSS policies** (Proposed Changes version)
Acceptable for majority of river stretches southwest of a line joining Ipswich and Harwich; frequently unacceptable north east of this line. Basis of 'acceptable' limit: Overall pass against River Quality Objectives.	Projected growth in number of households in East of England[37] may outstrip sewage treatment capacity. Increased area of developed land, amount of traffic and commercial activity increases potential for contaminated surface run-off. Pressure to intensify agricultural production to meet food needs of expanding population (especially with increased awareness of 'food miles') and/or increased demand for biomass fuels may increase diffuse agricultural pollution. Climate change – Reduced summer low flows reduce ability of rivers to dilute wastewater effluent, increasing stress on freshwater and brackish habitats. Climate change – Increased frequency and severity of storm run-off increases likelihood of intermittent discharges from combined sewerage systems, as well as contaminated surface run-off from agricultural and urban land. Climate change – Increased water temperatures promote growth of harmful bacteria, with impacts on water use for recreation.	ENV4: Promote expansion of agri-environment schemes to reduce diffuse pollution. ENV7: New development should reduce pollution. WAT2: Stakeholders to identify additional waste water treatment infrastructure to serve proposed development and LDDs to locate development where it can maximise existing infrastructure. Stakeholders to carry out water cycle and river studies to inform waste water treatment issues stemming from proposed development.
Water resources		
Surface water & associated groundwater (WRMUs): many of the WRMUs in the Haven Gateway have an unacceptable water resource availability status, including those surrounding the settlements of Ipswich, Colchester and Felixstowe. Groundwater	Increasing per capita household water consumption[38], coupled with projected growth in number of households in East of England[39]. Climate change – Changes in precipitation and evapo-transpiration likely to increase winter high flows and lower summer low flows. Climate change – Elevated temperatures likely to increase household demand for water for drinking, watering gardens etc.	ENV4: Encourage more sustainable agricultural use of water resources through winter storage schemes and wetland creation. ENV7: New development should promote resource efficiency. WAT1: EERA to monitor reduction in per capita water consumption achieved by joint initiatives between stakeholders. WAT2: Stakeholders to identify additional water supply infrastructure to serve proposed development and LDDs

[37] CLG (March 2007) Op. Cit.
[38] Ofwat (Nov 2006) Security of supply, leakage and water efficiency - Average household consumption in Anglian region increased from 137 l/head/d in 2001-02 to 144 in 2005-06
[39] CLG (March 2007) Op. Cit.

Current state relative to limit	**Pressures**	**Mitigating RSS policies** (Proposed Changes version)
(GWMUs): Confined Chalk GWMUs underlying East Suffolk and North Essex have unacceptable water resource availability, as do all 3 of the Coastal Crag GWMUs of the East Suffolk CAMS. Basis of 'acceptable' limit: CAMS Resource Availability Status of 'water available' or 'no water available'.		to locate development where it can maximise existing infrastructure. Stakeholders to carry out water cycle and river studies to inform water supply issues stemming from proposed development.
Soils		
(no basis for limit determined)	Land take for greenfield development land and associated mineral extraction increases risk that agriculturally productive land will be lost and functionality of other soils impacted by surface sealing. Increased regional population could lead to compaction of soils in greenspace used for recreation. Pressure to intensify agricultural production to meet food needs of expanding population (especially with increased awareness of 'food miles') and/or increased demand for biomass fuels may increase soil erosion. Climate change – sea level rise and resulting coastal retreat may reduce area of agriculturally productive land. Climate change – longer growing seasons and higher evapo-transpiration will have mixed effects on crop production.	SS2 & SS3: 60% of development to be on previously developed land and development to be concentrated in Key Centres for Development and Change of Ipswich and Colchester. ENV4: Promote expansion of agri-environment schemes to maintain and enhance the resilience and quality of soils. Encourage sustainable use of soils and maximize opportunities for restoration of degraded soil.
Geology		
89% of Earth Heritage SSSI units in the Gateway in acceptable condition. Basis of 'acceptable' limit: Natural England condition assessment of SSSI unit is	Demand for greenfield development land increases risk that valued earth heritage sites will be destroyed or obscured. Increased demand for mineral extraction sites may threaten valued geological sites.	SS2 & SS3: 60% of development to be on previously developed land and development to be concentrated in Key Centres for Development and Change of Ipswich and Colchester. ENV3: Nationally designated sites given the strongest level of protection. Ensure region's wider earth heritage protected

Current state relative to limit	**Pressures**	**Mitigating RSS policies** (Proposed Changes version)
'favourable'.		and enriched e.g. by: • Avoiding development harm to earth heritage; • Identifying, conserving and restoring regionally important geological and/or geomorphological sites and promoting their good management.
Land-based flora and fauna		
53% of biodiversity SSSI units in the Gateway in acceptable condition. Most units in unacceptable condition are estuarine habitats suffering erosion of the salt marsh due to coastal squeeze (plus possible contributions from recreation and dredging), with water pollution due to agricultural run-off another common problem. Basis of 'acceptable' limit: Natural England condition assessment of SSSI unit is 'favourable'.	Direct loss of habitats and disruption of ecological networks due to land take (including brownfield land) for development and disturbance to adjacent habitats. Increased regional population may increase recreation pressure on biodiversity sites via disturbance of species and damage to habitats. Indirect impacts on biodiversity of pressures on soils, water and air. Climate change – existing species distributions threatened due to changing 'biophysical envelope'. Climate change – coastal squeeze eroding coastal habitats such as salt marsh. Climate change mitigation – construction and operation of onshore wind farms, other land-based renewable energy systems and associated grid connections may disrupt terrestrial ecosystems.	SS2 & SS3: 60% of development to be on previously developed land and development to be concentrated in Key Centres for Development and Change of Ipswich and Colchester (although brownfield land can also have high biodiversity value). SS8: LDDs to ensure development in the urban fringe contributes to its biodiversity value. ENV3: Nationally and internationally designated sites given the strongest level of protection with no adverse development effects on European or international sites. 'Proper consideration' to effects of development on habitats and species outside designated sites. Ensure region's wider biodiversity protected and enriched e.g. by: • Avoiding development harm to county wildlife sites and, where possible, achieving net gains on development sites; • Promoting biodiversity in accordance with regional biodiversity targets and priorities in Regional Biodiversity Network Map; • Identifying and safeguarding areas for large-scale (>200 ha) habitat restoration; • Ensuring appropriate management and further expansion of wildlife corridors; • Establishing networks of semi-natural green spaces in built up areas (ENV1).

Current state relative to limit	**Pressures**	**Mitigating RSS policies** (Proposed Changes version)
		ENV5: Ancient semi-natural woodland and others of regional or national importance to be identified in LDDs with strong presumption against development. Nature conservation value of all woodlands recognised and conversion to other land uses should be resisted in absence of overriding public and ecological benefits. New woodland creation targeted, *inter alia*, at expanding and linking existing native woodland and creating new wet woodland to meet BAP targets.
Marine-based flora and fauna		
(limit determined for coastal and estuarine flora and fauna only – included within land-based flora and fauna)	Direct habitat damage and alteration to sediment dynamics by dredging to maintain shipping channels and construction of expanded port facilities. Pollution of coastal waters by land-based activities, including diffuse agricultural pollution and wastewater effluent (see water quality). Risk of increase in invasive alien species (e.g. zebra mussel) with increased shipping and port activities. Climate change – existing species distributions threatened due to changing sea temperatures and currents and their effects on physiology, behaviour and physical habitat. Climate change mitigation – construction and operation of offshore wind farms and tidal power schemes and associated grid connections may disrupt marine ecosystems.	SS9: LPAs and other agencies to seek conservation of the coastal environment and coastal waters. Also pursue opportunities for new coastal habitats (e.g. salt marsh and mudflats) in areas identified for managed realignment. ENV3: Promotes targets for BAP priority habitats including coastal habitats of the Suffolk Coast.
Landscape		
(limit determined for tranquillity only) 43% of land area has acceptable tranquillity, this proportion having fallen dramatically since the early 1960s. Main areas of noise and visual disturbance are	Greenfield development and associated infrastructure and transport networks reduce area of land unaffected by noise or visual disturbance. Linked to loss of tranquillity and increased population density is a gradual creep to a more managed and 'tamed' landscape. Any area of large scale development is	SS2 & SS3: 60% of development to be on previously developed land and development to be concentrated in Key Centres for Development and Change of Ipswich and Colchester. SS8: LDDs to ensure development in the urban fringe contributes to its character and appearance. SS9: LPAs and other agencies to seek

Current state relative to limit	**Pressures**	**Mitigating RSS policies** (Proposed Changes version)
the major settlements of Ipswich and Colchester, lesser settlements such as Felixstowe, Harwich, Clacton-on-Sea and the transport corridors that connect them to each other and to the strategic transport network, including the A12 and A14. Basis of 'acceptable' limit: Countryside areas not subject to intrusion of visual or noise pollution (CPRE study data).	likely to alter existing landscape character, although appropriate and high quality design coupled with use of previously developed land can mitigate the extent. Large infrastructure required to supply new dwellings and businesses with power, waste processing etc. will be highly visible in the flat landscape of the Haven Gateway. Climate change – sea level rise and increased river flooding will cause direct loss of some coastal and estuarine landscapes. Climate change – altered temperatures and water availability will change agricultural crops and natural ecosystems and hence land cover. Climate change mitigation – construction and operation of renewable energy generation facilities (particularly wind farms) and associated grid connections will alter the landscape.	conservation of the coastal environment, including natural character and tranquillity of undeveloped areas. ENV2: Afford highest level of protection to nationally designated landscapes (includes Suffolk Coast and Heaths AONB; Dedham Vale AONB; Suffolk Heritage Coast). Recognise, protect and enhance diversity and distinctiveness of nationally defined countryside character areas via: • Long-term, area-wide strategies based on landscape character assessment; • Development of criteria based policies to ensure development respects and enhances identified landscape character; • Securing mitigation where damage to landscape character unavoidable. ENV5: Target new woodland creation at transport corridors. Ancient semi-natural woodland and others of regional or national importance to be identified in LDDs with strong presumption against development. Promote new woodland planting where consistent with landscape character. ENV7: New development should make efficient use of land with housing achieving the highest net density commensurate with local character and public transport accessibility.
Open space		
(limit determined for accessible natural greenspace only) A negligible proportion of the total area of Haven Gateway has acceptable access to natural greenspace. Catchments of sub-regional ANG sites give the greatest population coverage while those of local sites give the least.	Land take for development may consume existing accessible open spaces. An increased regional population will have greater demand for open space for formal and informal recreation. Climate change – altered temperatures and water availability will change vegetation cover and hence the nature of open space and increase demand for shade.	SS2 & SS3: 60% of development to be on previously developed land and development to be concentrated in Key Centres for Development and Change of Ipswich and Colchester. SS8: LDDs to provide accessible green space networks linking urban areas with the countryside and set green space targets for urban extensions. ENV1: Identify, create, protect and manage green infrastructure, particularly in growth areas. LDDs should: • Define a green infrastructure

Current state relative to limit	**Pressures**	**Mitigating RSS policies** (Proposed Changes version)
Basis of 'acceptable' limit: Areas within maximum acceptable distances of hierarchy of natural greenspace sites (Landscape Partnership natural greenspace strategy thresholds and data).		hierarchy; • Require the retention and provision of substantial connected networks of green space in urban, urban fringe and adjacent countryside areas to serve new communities; Assets of particular regional significance for green infrastructure include Suffolk Coast and Heaths and Dedham Vale AONBs and the Suffolk Heritage Coast.
Historic environment		
(limit determined by reference to Listed Buildings at Risk register only) Basis of 'acceptable' limit: Area contains a Grade I or Grade II* listed building which is not on the English Heritage Buildings at Risk Register. N.B. The pressures and policies refer to a broader view of the historic environment than can be assessed using BAR as an indicator – broadening the indicator as data becomes available should be a priority.	Policy pressure for development on previously developed land may threaten character of historic town centres or industrial heritage, particularly if scale and form of buildings is inappropriate. Demand for greenfield development land increases risk that valued archaeological sites will be destroyed or become inaccessible; can result in loss of historic landscape features e.g. cropmarks; and may threaten the wider landscape setting of historic assets. Port development at Harwich and Felixstowe may threaten their historic assets within the towns, marine archaeology of the Stour and Orwell estuary and Landguard Fort. Climate change – increased coastal erosion and sea level rise will threaten the Haven Gateway's many coastal assets; raising sea walls will impact on their setting.	SS9: LPAs and other agencies to seek conservation of the coastal environment, including historic assets. ENV6: Identify, protect, conserve and, where appropriate, enhance historic environment, including settings of sites and features. Especially significant regional features are listed, including: • Historic market towns; • Cohesive hierarchy of smaller settlements; • Historic environment of the coastal zone; • Conservation areas and listed buildings • Ancient rural landscapes; • Archaeological monuments, sites and buried deposits. ENV7: Conservation-led regeneration should respect the quality and distinctiveness of traditional buildings and LPAs should give sensitive consideration to the opportunities presented by industrial, maritime and rural heritage.

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Figure 4.1: Air quality relative to limit

Key

Haven Gateway sub-region

Air Quality

Acceptable

Unacceptable

Basis of limit: Air Quality Objectives (AQOs) not currently met or expected not to be met for any 1 of 7 prescribed pollutants within a grid square equals 'Unacceptable'. All other cells 'Acceptable'.

N W E S

0 3 6 12 Km

Source: Local Air Quality Monitoring (LAQM) reports from local authorities

Date: 11/01/2008
Revision: C

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Figure 4.2: Water quality relative to limit

Key

Haven Gateway sub-region

Water Quality

Acceptable

Unacceptable

River stretch not assessed

Water Quality

Acceptable

Unacceptable

N/A - No assessed river stretches present

Basis of limit: the longest acceptable or unacceptable river/estuary segment in each grid square. Acceptable river/estuary stretches are those achieving overall compliance with River Quality Objectives (RQOs) / Classification of Estuaries Working Party (CEWP) objectives set by the Environment Agency.

N W E S

0 3 6 12 Km

Source: Environment Agency

Date: 11/01/2008
Revision: C

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Figure 4.3 Surface water resources relative to limit

Key

Haven Gateway sub-region

Integrated WRMU Status

Acceptable

Unacceptable

N/A - No assessed WRMUs present

Basis of limit: Water resource availability status for each Water Resource Management Unit (WRMU) set by the Environment Agency. For every cell the area of each category is calculated (Acceptable / Unacceptable / N/A). The category with the largest area is attributed to that cell.

N W E S

0 3 6 12 Km

Source: Environment Agency

Date: 11/12/2007
Revision: C

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Figure 4.4: Groundwater resources relative to limit

Key

- Haven Gateway sub-region
- Confined Chalk Groundwater Management Units (GWMU)
- GWMU: Coastal Crag associated with the Felixstowe Peninsula

Integrated GWMU Status

- Acceptable
- Unacceptable
- N/A - No assessed GWMUs present

Basis of limit: Water resource availability status for each Ground Water Management Unit (GWMU) set by the Environment Agency. For every cell the area of each category is calculated (Acceptable / Unacceptable / No Data). The category with the largest area is attributed to that cell.

N W E S

0 3 6 12 Km

Source: Environment Agency

Date: 11/01/2008
Revision: C

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Figure 4.5: Geology relative to limit

Key

Haven Gateway sub-region

Condition of SSSI

- Acceptable
- Unacceptable
- N/A - no SSSI units present

Basis of limit: Natural England's SSSI unit condition assessment. Cells were categorised based on largest area of either acceptable or unacceptable that fell within it. If a cell had no SSSI present then 'no data' was recorded.

N W E S

0 3 6 12 Km

Source: Natural England

Date: 11/12/2007
Revision: C

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File: S:\4000\4058 Environmental Capacity in the East of England\GIS\Themes\ArcGIS9\4058-03_006_SSSI_Cond_Geology_revc.mxd

Environmental Capacity in the East of England: Final Report

Figure 4.6: Land-based flora and fauna relative to limit

Key

Haven Gateway sub-region

SSSI Condition

- Acceptable
- Unacceptable
- N/A - no SSSI units present

Basis of limit: Natural England's SSSI unit condition assessment. Cells were categorised based on largest area of either acceptable or unacceptable that fell within it. If a cell had no SSSI present then 'no data' was recorded.

N W E S

0 3 6 12 Km

Source: Natural England

Date: 11/01/2008
Revision: C

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File: S:\4000\4058 Environmental Capacity in the East of England\GIS\Themes\ArcGIS9\4058-04_006_SSSI_Cond_Biodiversity.mxd

Environmental Capacity in the East of England: Final Report

Figure 4.7: Tranquillity relative to limit

Key

Haven Gateway sub-region

Noise and Visual Intrusions

Unacceptable

Acceptable

Basis of limit: CPRE's Intrusion map for 2007. The Intrusion map shows 'areas disturbed by noise and visual intrusions' and 'undisturbed areas'.
Undisturbed = Acceptable and Disturbed = Unacceptable

N W E S

0 3 6 12 Km

Source: CPRE (2007)

Date: 11/01/2008
Revision: C

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File: S:\4000\4058 Environmental Capacity in the East of England\GIS\Themes\ArcGIS9\4058-04_007_Intrusion.mxd

Environmental Capacity in the East of England: Final Report

Figure 4.8: Open space relative to limit

Key

Haven Gateway sub-region

Areas within Catchments of Local, District, Sub-Regional or Regional Open Space Sites

Acceptable

Unacceptable

Basis of limit: If a cell has 50% or more of its area within the catchment area of either a Local, District, Sub-regional or Regional accessible natural greenspace site then it will be acceptable, otherwise it is classed as unacceptable. Catchments are those defined by The Landscape Partnership for the Haven Gateway Partnership's draft Accessible Natural Greenspace (ANG) strategy and are based on TCPA ANG standards.

N W E S

0 3 6 12 Km

Source: Landscape Partnership

Date: 11/01/2008
Revision: C

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File: S:\4000\4058 Environmental Capacity in the East of England\GIS\Themes\ArcGIS9\4058-04_008_Angst_Open_Space.mxd

Environmental Capacity in the East of England: Final Report

Figure 4.9: Historic environment relative to limit

Key

Haven Gateway sub-region

Condition of historic environment

- Acceptable
- Unacceptable
- N/A - no Grade I or Grade II* listed building present

Basis of limit: English Heritage's 'Buildings at Risk' register (BAR). If a cell contains a BAR it equals unacceptable. If a cell contains a listed building (Grade I or II*) but no BAR then acceptable. If a cell contains no listed building (Grade I or II*) then 'N/A – no listed building present' is recorded.

N W E S

0 3 6 12 Km

Source: English Heritage

Date: 11/01/2008
Revision: C

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S:\4000\4058 Environmental Capacity in the East of England\GIS\Themes\ArcGIS9\4058-03_016_Historic_Env_Thresholds_revC.mxd

Environmental Capacity in the East of England: Final Report

Figure 4.10: Composite environmental limits map

Key

Haven Gateway sub-region

Cumulative score of unacceptable cells

- 0
- 1
- 2
- 3
- 4
- 5

Basis of limit: the total number of environmental assets having an unacceptable condition relative to threshold in each grid square. Limits used: Air Quality, Water Quality, Water Resources (rivers), Water Resources (groundwater), Geology, Biodiversity, Tranquillity, Open Space, Historic Environment.

N W E S 0 3 6 12 Km

Source:
Natural England
Environment Agency
CPRE (2007)
Landscape Partnership
LAQM reports from Local Authorities

Date: 11/01/2008
Revision: C

LAND USE CONSULTANTS
ENVIRONMENTAL PLANNING, DESIGN AND MANAGEMENT

File: S:\4000\4058 Environmental Capacity in the East of England\GIS\Themes\ArcGIS9\4058-04_010_Cumulative_Map.mxd

5. CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Environmental limits and spatial planning

5.1. This study set out to investigate the concept of environmental capacity and its application in regional spatial planning. At the heart of this concept is the question of how much development can be accommodated in an area without causing an unacceptable decline in environmental quality and the benefits or services that humans derive from the environment.

5.2. Our over-arching conclusion is that the paucity of data on the condition of environmental services and the lack of scientific understanding and analytical tools in respect of the changes in environmental services that can be expected as a result of different amounts of types of development mean that this question cannot currently be answered. Indeed, in addition to an almost complete lack of data on the state of environmental services, even data on the environmental assets themselves are often absent, incomplete or inconsistent.

5.3. Whilst it was not possible to deliver a method for determining whether particular development proposals will exceed environmental capacity, it has nevertheless been possible to design and test a practical method which aids consideration of environmental limits in a consistent and transparent way in the spatial planning process. As described below, this improves on current environmental planning practice in a variety of ways and thus contributes to more sustainable outcomes, including more effective protection of the environment.

What does the method add to current practice?

5.4. Notwithstanding the limitations of the case study in terms of availability of suitable environmental data and limited stakeholder inputs, the five step method is capable of practical application. As far as we know, this is the first attempt to give expression comprehensively to environmental capacity concepts (including the 'living within environmental limits' agenda) in the strategic planning field.

5.5. The method brings to the table a wide range of environmental information of which planning needs to take account. This includes both data on the state of the environment relative to limits and other environmental information (described in this report as 'information layers'). Furthermore, the presentation of environmental monitoring data in relation to defined limits allows diverse types of environmental data to be illustrated in a common format, providing consistency and assisting understanding by non-technical users of the data. The use of a spatial 'grid square' approach, which could be replicated regionally and nationally, also helps this consistent, user-friendly presentation and there is potential for socio-economic data to be brought into line with the approach, allowing environmental data to be viewed alongside deprivation indicators, for instance.

5.6. As explained in **Chapter 3**, the assessment of the state of the environment in relation to limits provides a basis for assessing the significance of development impacts. This has clear application in supporting Sustainability Appraisal (SA) of development plans which must also undergo Strategic Environmental Assessment (SEA) and meet the SEA Directive's significance criteria. In contrast, current practice tends to focus on assessment of the direction of change in sustainability indicators, whilst struggling to conclude when that change becomes unacceptable. The evidence base for SA/SEA can also benefit from the method's ability to bring together the best available environmental information in a consistent, easily interpreted form. The locally informed and spatially specific nature of the environmental limits defined in the methodology can also support the identification of mitigations which is an integral part of the SA/SEA process. By highlighting the locations within the plan area where specific environmental limits are expected to be breached, more targeted mitigations can be suggested, for example by indicating particular sustainable design features that would need to be incorporated in development at that location to maintain the environment within the pre-defined limits.

5.7. The process of agreeing with stakeholders the best indicators with which to gauge the state of the environment and the limits at which key indicators become unacceptable provides a way of integrating objective, scientific knowledge and subjective, societal views in a more transparent way than is currently the case. Rather than introducing additional subjectivity to the decision-making process, the method instead serves to make value judgements and assumptions more explicit. The role of stakeholders is likely to be particularly important in the short term, until improvements of the kind recommended below can be made to environmental information.

5.8. Finally, the outputs of the method are helpful to strategic planning, particularly in terms of defining spatially-specific, as opposed to generic, policy prescriptions that respond to the environmental limits data. Different limits can be applied in different locations, according to local priorities, as was the case for the assessment of water quality in this report.

Other strengths of the method

5.9. The method offers flexibility, since the indicators or limit values can readily be revisited as our understanding of the environment and the range of routinely collected data improve. In addition, improved monitoring data could underpin use of multiple indicators to assess the state of individual environmental assets or services to provide a fuller picture of current state than the single indicators used in the Haven Gateway case study.

5.10. It would also be possible to carry out sensitivity testing by attributing different weights to different environmental assets/services or to use a weighting system to reflect priorities established by other techniques involving stakeholder inputs, for example environmental valuation or the Quality of Life Assessment approach.

Links to Defra's Ecosystems Approach

5.11. Defra's Action Plan[40] sets out a programme of work that will embed an 'Ecosystems Approach' in policy-making and delivery. It provides a valuable strategic framework which should, in the future, provide for better informed and more holistic protection of the environment in spatial planning policy formulation and decision making. The need for the plan arose from commitments for further work on environmental limits made in the UK Sustainable Development Strategy which in turn echo research needs identified internationally, for example in the Convention on Biological Diversity (CBD). The 'Ecosystems Approach' refers to integrated management of the range of demands on the natural environment in such a way that it can indefinitely support essential services and provide benefits for all.

5.12. The Ecosystems Approach recognises that '*the planning system plays a vital role in the protection and enhancement of the natural environment'* and seeks to embed its principles in the planning system[41]. In focussing on ecosystems services, however, the Ecosystems Approach will have to overcome significant shortfalls in the existing evidence base. These evidence needs are acknowledged in the Action Plan and supported by our own findings in early stages of this project.

5.13. The environmental limits method provides a pragmatic tool which complements the Ecosystems Approach by making use of existing environmental information to take account of environmental limits, as far as these data allow. Furthermore, the tool is flexible enough to incorporate information on the state of environmental services rather than assets, as this becomes available through the research and improved monitoring advocated by Defra.

Prerequisites for successful application of the environmental limits method

5.14. In order to provide a sound evidence base for strategic spatial planning and to set the parameters for planning decisions, it was clear from this study that analysis of the environment relative to limits has two key prerequisites:

- Availability of data in a suitable form for assessing the environment in a robust, measurable way.
- Determination of both environmental indicators and limits early on in the planning process, with the support of key stakeholders and the public.

5.15. Although these essential components were not fully in place for the Haven Gateway case study, the recommendations below suggest how the conditions necessary for a robust application of the method could be met.

[40] Defra (2007) Op Cit
[41] Ibid.

RECOMMENDATIONS

Enhancements to the method and data

Measuring environmental services and benefits

5.16. As stated in **Chapter 3**, the environment is important not just for its own sake but because it provides a wide range services which directly or indirectly benefit humankind. Although many of these services are fundamental to human survival, quantitative data on their provision are lacking. As scientific understanding of the interacting processes within ecosystems and the functions provided by the environment improves, monitoring data on service provision should become more readily available. Indicators of the current state of the environment within the five step method should then be replaced by indicators of environmental service provision. These improvements are consistent with the goals of Defra's Ecosystems Approach but they are only likely to be realised in the longer term. In the short term, the outputs of the method could be improved by addressing some of the limitations of the data on the current state of the environment itself which were identified during the case study (see **Appendix 3**). Recommendations on these improvements are set out below.

Sub-regional environmental topics

Air

5.17. Ideally, the air quality data underlying the threshold analysis would all be derived from continuous monitoring rather than modelling. Nevertheless, the Local Air Quality Monitoring (LAQM) data used in the Haven Gateway case study provide a good basis for assessment of air quality relative to limits in the future and in other study areas across the East of England or nationally.

Water quality

5.18. A more complete picture of river water quality could be obtained by using additional indicators and related limits. In particular, nitrate concentration is not included in the basket of chemical measures used in the Haven Gateway case study to assess River Ecosystem health. This is a particularly important measure in rural areas where diffuse agricultural pollution is an issue. This is the case in a number of the Haven Gateway's catchments, as illustrated by their inclusion as 'priority catchments' within the Defra/Natural England Catchment Sensitive Farming scheme which could also provide additional monitoring data.

5.19. Partial coverage of coastal water quality could be obtained by adding data from monitoring for compliance with Bathing Water Directive targets at bathing beaches.

5.20. The forthcoming Water Framework Directive assessments will look at the water environment as a whole, integrating water quality, quantity and physical habitat with ecological indicators. The aim will be to determine whether water bodies, including estuarine and coastal waters, have a 'good ecological status' or potential. This assessment should replace the current RQO/CEWP water quality indicator data employed in the Haven Gateway case study.

Water resources

5.21. The forthcoming Water Framework Directive assessments will look at the water environment as a whole, integrating water quality, quantity and physical habitat with ecological indicators. The aim will be to determine whether water bodies, including estuarine and coastal waters, have a 'good ecological status' or potential. This assessment should replace the current CAMS water resource availability data employed in the Haven Gateway case study.

Soils

5.22. A variety of potential indicators of the current state of soils and the services soil provides were suggested by stakeholders and recorded in the Topic Reports (Table 4.4). Possible direct indicators include changes in the area of soil sealed by an impermeable material (e.g. concrete); loss of soil to development, analysed by Agricultural Land Classification grade; the amount of organic carbon in soil; or the area of soil permanently lost to coastal erosion due to coastal squeeze. Possible indirect indicators include the area of new development on brownfield land; the area of land under an Entry Level Stewardship Soil Management Plan; or the area of current mineral workings covered by soil restoration and aftercare conditions. If monitoring data were to become available, these types of indicators and associated limits could be used to include soils within the spatial analysis of environmental limits.

Geology

5.23. In order to obtain a comprehensive information source to support planning rather than one based on representative examples, data on the condition of Local Geological Sites/Regionally Important Geological Sites (RIGS) should also be included. These are designated on the basis of four nationally agreed criteria:

- The value of a site for educational purposes in life-long learning;
- The value of a site for study by both professional and amateur Earth scientists;
- The historical value of a site in terms of important advances in Earth science knowledge, events or human exploitation;
- The aesthetic value of a site in the landscape, particularly in relation to promoting public awareness and appreciation of Earth sciences. [42]

5.24. Currently, however, condition assessments of RIGS are not readily available, although they could readily be incorporated at a later date if comprehensive monitoring data became available.

Terrestrial biodiversity

5.25. A comprehensive consideration of designated sites should add data on the condition of Local Wildlife Sites and factors required to maintain their integrity to the SSSI data used in the case study. As Defra confirms, these sites *'make a vital contribution to delivering both the UK and Local Biodiversity…Action Plan targets and maintaining local*

[42] Defra (2006) Local Sites: Guidance on their Identification, Selection and Management

natural character and distinctiveness' and *'provide important…refuges for…fauna and flora, and through their connecting, stepping stone and buffering qualities, support other site networks.'*[43] At present, however, few condition assessments of Local Wildlife Sites are available.[44]

5.26. An even more comprehensive approach would be to move beyond designations to identify the most valued and/or threatened species and habitats regardless of their location (including those contained within Local Biodiversity Action Plans), to develop a detailed understanding of the biotic and abiotic conditions necessary to maintain the ecosystems of which they are part and then to develop spatial plans which best protect or enhance those conditions. Data are not currently available to support such an ecosystem-based approach.

5.27. The lack of suitable data to assess biodiversity outside of SSSIs could be addressed through additional resources being made available to support local records offices which are currently over-reliant on the voluntary sector and which fail to provide full geographic coverage or consistency of data collection across the region.

Marine biodiversity

5.28. Suggestions regarding coastal and estuarine SSSIs are included under land-based flora and fauna above. Defra's report on the state of the UK's seas[45] acknowledges the need for further development of indicators of the current state of our marine ecosystems such as indicator species that demonstrate good ecological status of marine waters or measures of species diversity relative to that expected in a pristine environment. It further notes that the necessary framework for coordinating and taking forward this new work on indicators will be addressed during the development of the UK Monitoring Strategy and through national marine research programmes. As indicators of marine ecosystem health become available, they could be readily incorporated into a tool to spatially illustrate environmental limits.

Landscape, including tranquillity

5.29. An indicator for landscape which reflects a broader view of the services provided by landscape than just tranquillity is required. The only relevant dataset of which we are aware which currently exists for all of Haven Gateway is Natural England's 'Countryside Quality Counts' (CQC) which assesses changes in countryside quality over time. This national dataset is not at a sufficiently detailed scale to identify areas of landscape change within a sub-region. Nonetheless, a similar approach at a more detailed scale would provide a useful basis for limits assessment with landscape character areas that are either being maintained or improved (consistent with an agreed vision for that character area) classed as falling within the environmental limit. Also useful would be comprehensive studies which identify the sensitivity of different landscape character areas to development. It should be noted that a Regional Landscape Character Assessment Study is underway[46]. The first phase examining

[43] Defra (2006) Op. cit.
[44] Essex Wildlife Trust (2007) Pers. comm.
[45] Defra (2005) Charting Progress: An Integrated Assessment of the State of UK Seas
[46] Natural England is leading the preparation of an Integrated Regional Landscape Framework for the East of England. As the first stage of this process Steven Warnock from the Living Landscapes Project (based at

landscape typology has been completed and future stages will examine the historic environment and the sensitivity of landscapes to certain levels of development.

Open space

5.30. Studies are needed which will allow the level of provision of the environmental regulation functions of open space, such as mitigation of flood risk or enhancement of biodiversity, to be determined. As part of a wider ecosystem-based assessment, such studies can then inform judgements of whether an environmentally acceptable level of open space exists in an administrative area.

Historic environment

5.31. The analysis of the Historic Environment would be improved by geographically comprehensive and consistent condition assessments of the different types of historic asset within the region. Data on Buildings at Risk needs to be expanded at local authority level to cover grade II listed buildings. English Heritage is currently seeking to expand Heritage at Risk data sets to cover an assessment of Scheduled Monuments and Conservation Areas. This will require partnership working with local authorities.

5.32. Information on the condition of individual historic assets is vital to ensure their future management. However, point data of this kind is has limited value in terms of supporting Strategic Planning decisions through the methodology in this report. A wider character based approach should be developed to capture the significant aspects of the historic environment relevant to Strategic Planning and SEA work.

5.33. English Heritage has developed a Historic Landscape Characterisation database in partnership with the County Historic Environment Teams and this data set offers further potential for interpretation and use. Essex has pioneered Historic Environment Character zones to provide a wider view of sensitivity across whole districts. Cultural Heritage Assessments of key settlements are crucial to ensuring that the distinctive character of towns and cities from Ipswich to Woodbridge are understood before decisions on growth are taken. Recent Cultural Heritage Assessments commissioned by EEDA, supported by English Heritage, provide a model.

Broader scale 'global' issues

5.34. As noted in **Chapter 4**, climate change is a critical consideration for planning in that the scale of its impacts on the environment, and indirectly on economic and social systems, is enormous. Human responses to climate change will result in significant indirect environmental impacts, for instance the landscape impacts of widespread onshore windfarms and cultivation of biomass crops.

University of Reading) is developing a nested GIS based landscape character framework for the East of England, and from this producing 50 or so draft Landscape Character Types (LCT). This contract will be completed by May 2008 and will form the basis for further work on sensitivity analysis and strategy definition for each LCT. The final product will sit alongside the Historic Landscape Characterisation mapping produced by English Heritage and the Regional Biodiversity Network Map created by the Regional Biodiversity Forum.

5.35. This study concluded that the appropriate planning policy response to this broader scale issue is generic rather than spatially-specific at this scale. However, the generic policies in regional policy need urgently to be translated into action on the ground, taking account of sub-regional scale environmental limits. This should be through sub-regional strategies that are fully integrated and consistent with RSS[47].

Taking the approach forward: implications for policy and practice

5.36. In order to ensure successful adoption of an environmental limits approach into the mainstream of planning, we recommend that national guidance be issued on how the 'living within environmental limits' agenda and 'the ecosystems approach' (Defra's Action Plan) can be embedded in the planning system. It should be noted that Defra's Strategy Unit for the Natural Environment has already indicated a desire to increase awareness of this study within Defra and CLG.

5.37. As previously noted, the environmental limits method could make a valuable contribution to SA/SEA by supporting assessment of the significance of anticipated development plan impacts, by bringing more environmental information to the table in a consistent, readily applied format and by helping to suggest spatially specific mitigation. We therefore recommend that CLG should produce guidance on the consideration of environmental limits within SA and the potential benefits of using a methodology such as that proposed in this report. This would not only improve the robustness of SA but help to bring consideration of environmental limits into the mainstream of planning by attaching it to an established, statutory process for which responsibilities are already clearly established.

5.38. We also concluded that successful implementation of the environmental limits method requires improvements to environmental monitoring. We recommend that national bodies should 'own' the indicators associated with different environmental themes (e.g. Natural England could take responsibility for those relating to terrestrial biodiversity, marine biodiversity, landscape; the Environment Agency for air quality, water quality, water resources; English Heritage for the historic environment and so on). These national agencies could be responsible for:

- Validating which currently available indicators provided the best overview of current state;
- Defining standard data collection and analysis methods for use by regional/local partners (e.g. regional observatories; local biodiversity records offices);
- Carrying out research into improved methods for monitoring environmental state;
- Monitoring the locally available resources for local data collection and lobbying for additional resources where these fail to meet minimum standards;
- Advising regions and local authorities on logical (i.e. supported by scientific research and/or best practice) levels at which to limits might be set, with the

[47] A similar conclusion and recommendation was made in the recent report 'How green is my Region', produced by CPRE, FOE and WWF in 2007.

actual threshold then determined or validated locally through stakeholder consultation at an early stage of the plan-making process.

5.39. The statutory agencies will not be able to bring about the necessary improvements to environmental data on their own and it is not suggested that they take on the data gathering role. Instead, data providers and those with data needs work together more collaboratively to develop the capacity of the region to provide environmental information.

5.40. For example, with respect to biodiversity data requirements, this could be achieved by EEDA, GO-East, EERA, Local Authorities, and the statutory and NGO environmental organisations working in partnership with the Local Records Centre at the regional level e.g. by attending and contributing to the work programme of the newly formed Biodiversity Information Group. In respect of the historic environment, English Heritage is heavily involved in promoting characterisation and Heritage at Risk, this is mostly through developing techniques and part funding local authorities to carry out work and maintain their skills. The County Historic Environment Record Offices are particularly important in this. District authorities are best placed to collect certain types of information such as Grade II Listed Buildings at Risk. A useful model for effective collation and analysis of environmental data is the establishment of Regional Technical Advisory Bodies to assemble relevant local information for waste planning which, in common with the analysis of environmental limits, is data intensive.

5.41. While the method is valuable in bringing together information on environmental limits to inform spatially specific planning policy development, a complete picture requires further work on quantifying the effects of different types and scales of development on the environment. This will allow consideration of environmental stress points in the light of more informed judgements about whether development proposals are likely to move the environment to an unacceptable state or worsen the state of the environment in locations where limits have already been breached. Models developed by such work should be capable of application in all UK regions and should therefore be the subject of national level resourcing and co-ordination although their implementation will require local expertise to improve the quality of outputs and promote commitment to the tools.

5.42. The review of the East of England RSS is due to commence in 2008. In the short term, wholesale application of the environmental limits method to this review is not recommended. Nevertheless, we suggest that the information already assembled, both on the current state of the environment relative to thresholds and the information layers, represents a valuable reference source of spatial data which can be referred to and built upon during the RSS review. It is important that EERA promote and support the environmental limits approach to gain recognition for it within regional and national bodies, and to bring more certainty to and support for the most suitable environmental indicators and limits in the longer term.

5.43. The 2007 Sub-National Review (SNR) announced that Regional Development Agencies (RDAs) will be designated as the regional planning body (RPB), pending the necessary primary legislation. Given the historic primary role of RDAs as strategic drivers of regional economic development, there is a risk that the environment could

enjoy less attention than under the current planning regime. In the longer term, a finalised and fully-supported environmental limits method has the potential to provide a strong framework for enhancing the profile of the environment in the move to the new integrated system of regional planning and to become a key tool for preparation of the new Integrated Regional Strategies.

APPENDIX I

STEERING GROUP MEMBERS

Name	Organisation
Graham Nelson (Chair)	EERA
Jo Worley	EERA
Alan Wheeler	EERA
Mary Marston	GOEAST
Sarah Wordingham	GOEAST
Fiona Bryant	EEDA
Lesley Anderson	EEDA
Sarah Hamley	Natural England
Sarah Fowler	Environment Agency
John Giles	Environment Agency
Katharine Fletcher	English Heritage
Paul Wilkinson	Regional Environment Forum
Peter Holborn	Suffolk County Council
Sarah Jennings	Suffolk County Council

APPENDIX 2

STAKEHOLDER CONSULTEES

Name	Organisation
Gary Parsons	Anglian Water
Corrine Meakins	CPRE
Katharine Fletcher	English Heritage – East of England
Katy Hoskyn	English Heritage – East of England
Michael Munt	English Heritage – East of England
David Seccombe	Environment Agency
Fiona Ireland	Environment Agency
Graham Wilson	Environment Agency
James Tradewell	Environment Agency
John Giles	Environment Agency
Nicola Miller	Environment Agency
Paul Hayward	Environment Agency
Will Robinson	Essex & Suffolk Water
Adrian Gascoyne	Essex County Council
Martin Wakelin	Essex County Council
Giles Brockman	Forestry Commission
Denis Cooper	Ipswich Borough Council
Gary Wright	Mid-Suffolk DC
Simon Garnier	National Trust
Adam Gretton	Natural England
David Vose	Natural England
Graham King	Natural England
Julie Holloway	Natural England
Chris Tyas	RSPB
Peter Holborn	Suffolk Biodiversity Partnership; Suffolk County Council
Edward Martin	Suffolk County Council
Sarah Jennings	Suffolk County Council
Simon Neesam	The Landscape Partnership
Tony Chadwick	Woodland Trust

APPENDIX 3

HAVEN GATEWAY ENVIRONMENTAL INDICATORS

This Appendix describes the method and data used to characterise each environmental asset within Haven Gateway, as well as discussing the limitations of the data sets used. Suggestions for addressing these limitations are provided in **Chapter 5**.

AIR QUALITY

The Air Quality Regulations prescribe objectives for seven pollutants and require local authorities to assess air quality in respect of these. Assessments are carried out via a combination of active sensors, passive diffusion tubes (for nitrogen dioxide measurement) and annual forecasts using the Highways Agency's Design Manual for Roads and Bridges (DMRB) model.

The assessment process used by local authorities has two stages:

- An Updating and Screening Assessment (USA), typically carried out once every three years, using a checklist to identify areas where there is a risk that any of the Air Quality Objectives (AQOs) may be exceeded.
- A Detailed Assessment (DA), to identify with reasonable certainty whether or not an exceedance will occur.

Where a DA indicates that any of the air quality objectives are likely to be exceeded, an Air Quality Management Area (AQMA) is designated and an action plan produced to tackle the issue. In any years when these reports are not required, a Progress Report must be produced to provide an air quality update for the district.

The most recent published local authority assessment and progress reports have been used to determine the current state of air quality within the Haven Gateway. Areas reported as not currently meeting AQOs or as having a significant risk of not meeting AQOs and requiring Detailed Assessment have been mapped as having unacceptable air quality. All other areas are shown as meeting an acceptable limit.

In attempting to apply the method to illustrate environmental limits with respect to air quality, the following data limitations were apparent:

- The local authority assessments underlying the limit map rely in part on model forecasts and are therefore subject to the accuracy of the input assumptions on, for example, volume and speed of road traffic, and the robustness of the model calculations.
- Only the seven pollutants specified by the Air Quality Regulations have been considered, namely benzene, 1,3-butadiene, carbon monoxide, lead, nitrogen dioxide, particulate matter (PM10) and sulphur dioxide.

WATER QUALITY

The Environment Agency is currently in the process of designing and implementing a new water monitoring regime which will meet the Water Framework Directive (WFD) requirement to conclude whether waters are of Good Ecological Status/Potential. Following discussion with personnel in the Environment Agency's East of England area office it was decided that until this becomes operational, the best basis for assessing water quality relative

to acceptable limits would be compliance with River Quality Objectives (RQOs) which are set for all rivers and provide the current targets until the WFD ones comes into force.

RQOs involve the designation of river stretches for particular uses such as maintenance of ecosystem health, abstraction for public water supply or irrigation for field crops. The range of uses considered varies by region with the exception of River Ecosystem health (RE) which is a national system and one for which data were readily available for the pilot study. RE classification is based on the type of fish population which a river can support; this provides a proxy for river ecosystem health. RE ranges from RE1 classification (water of very good quality and suitable for all fish species) down to RE5 (water of poor quality which is likely to limit coarse fish populations). Each RE class requires a basket of chemical water quality criteria to be achieved, these subsidiary measures being Biochemical Oxygen Demand (BOD); dissolved oxygen (O_2); pH; ammonia concentration, un-ionised ammonia concentration, dissolved copper and total zinc.

Water quality in tidal estuaries does not fall under the RQO monitoring regime. For these waters, the Environment Agency provided Classification of Estuaries Working Party (CEWP) data. This is a subjective, points based scoring system which ranks water from Good Quality (Class A) to Bad Quality (Class D). The system combines an assessment of the biological and aesthetic state of the water with measurements of the minimum levels of dissolved oxygen. As for the RQO data, water quality was deemed to be meeting an acceptable limit if the achieved water quality grade met the Environment Agency's objective for the stretch of water in question.

Rivers which are 'unclassified' under the RE classification system may either be of such poor quality that fish are unlikely to be present, have limited flow or be rivers for which insufficient data exist. A more useful system would differentiate rivers of very low quality from those for which no data exist.

Although target-based indicators such as RQOs provide a useful basis for an environmental limit, they may be misleading in that they are not an absolute measure of water quality. Thus, failure to meet RQOs in a particular location does not necessarily mean that water quality is lower than in another location where RQOs are met but may instead be due to the river at the former location being used for purposes which are more sensitive to low water quality.

National comparisons of water quality under this system are hindered by the fact that the uses against which water quality is assessed differ from region to region, depending on regional circumstances.

WATER RESOURCES

The acceptability of water resources within the Haven Gateway was examined by reference to the Environment Agency's Catchment Abstraction Management Strategies (CAMS)[48,49] for the Anglian Region. CAMS provide a basis for future abstraction licensing decisions by splitting a catchment such as East Suffolk into areas of water that can be separately managed

[48] Environment Agency (2007a) The Combined Essex Catchment Abstraction Management Strategy, February 2007.
[49] Environment Agency (2007b) The East Suffolk Catchment Abstraction Management Strategy: Consultation Document, September 2007.

and assigning a water resource availability status to each. The status is based on the amount of abstraction that can occur during seasonal periods of low flow without damaging river needs, primarily ecological integrity but also amenity, navigation and other human uses.

The four possible categories of resource availability status and their implications for licensing further abstraction are shown in **Table A3.1**. For the purposes of this pilot study, management units with a resource availability status of 'Water Available' or 'No Water Available' were classified as meeting an acceptable limit while 'Over-licensed' or 'Over-abstracted' units were deemed unacceptable. This study used the Integrated rather than the Individual status of each WRMU, which has the advantage of also taking into account the consequences of abstraction for downstream river stretches (or linked, overlying river stretches in the case of groundwater WRMUs).

Table A3.1: Resource availability status categories[50]

Resource availability status	Abstraction licence availability
Water available	Water is likely to be available at all flows including low flows. Restrictions may apply.
No water available	No water is available for further licensing at low flows. Water may be available at higher flows with appropriate restrictions.
Over-licensed	Current actual abstraction is such that no water is available at low flows. If existing licences were used to their full allocation they could cause unacceptable environmental damage at low flows. Water may be available at high flows, with appropriate restrictions.
Over-abstracted	Existing abstraction is causing unacceptable damage to the environment at low flows. Water may still be available at high flows, with appropriate restrictions.

The units into which the catchment is split in the CAMS are of two types:

- Water Resource Management Units (WRMUs) - cover the management of surface waters and any associated groundwater which contributes to river flows; and
- Groundwater Management Units (GWMUs) – groundwater without associated river flows.

The resource availability statuses of WRMUs and GWMUs were plotted as separate limit map layers since they are effectively functionally separate.

In contrast to the forthcoming Water Framework Directive classifications, the CAMS classifications used here only offer an indirect measure of the current state of the freshwater environment and are influenced by existing permissions for abstraction that exist rather than focusing purely on a river's ecological health.

The approach taken also considered the rivers and groundwater of the Haven Gateway in isolation when in reality water supplies for the sub-region's people and its environment are supported by a complex system of river transfers, groundwater augmentation and reservoirs.

[50] Environment Agency (2007b) Op. Cit.

SOILS

Due to a lack of relevant data in the Haven Gateway (and probably elsewhere in the East of England), a limit was not defined for soils. This environmental asset could not, therefore, be considered included when piloting the method.

In the absence of an analysis of limits, a spatial representation of different soil types within the Haven Gateway was produced for information, using Cranfield University's 'NatMap Soilscapes' data. This is shown as an information layer that can be toggled on or off within the interactive limits map. In common with other information layers, this does not contribute to the scores used to generate the cumulative limits map.

GEOLOGY

Condition assessments of geological SSSIs carried out by Natural England were used to represent the current state of geology within the Haven Gateway in relation to acceptable limits. Those sites assessed as in 'favourable' condition were deemed to meet an acceptable environmental limit whilst all other possible conditions (unfavourable recovering; unfavourable no change; unfavourable declining; part destroyed and destroyed) were classified as unacceptable.

As with the assessment of biodiversity discussed in the following section, confining the assessment of the sub-region's geology to a single dataset of nationally designated sites is a significant limitation of the method.

LAND-BASED FLORA AND FAUNA

For the purposes of this pilot study, the available data considered to provide the best overview of the current state of terrestrial flora and fauna within the Haven Gateway were the condition assessments of biodiversity SSSIs carried out by Natural England. Those sites assessed as in 'favourable' condition were deemed to meet an acceptable environmental limit whilst all other possible conditions (unfavourable recovering; unfavourable no change; unfavourable declining; part destroyed and destroyed) have been classified as unacceptable.

Although various other biodiversity records exist, they generally give no indication of condition/quality (for example data on the National Biodiversity Network Gateway simply lists species that have been recorded in a particular grid square) or focus on a single species or habitat.

Attempting to convey the current state and pressures upon terrestrial biodiversity in an area such as the Haven Gateway, based solely upon the reported condition of SSSIs has major limitations. As stated for geology, SSSIs are selected as representative examples of the most valued features and thus, do not provide comprehensive coverage of valued habitats and species. A site-based approach also ignores the importance of connectivity between habitat patches or populations and the ecological benefits that such networks deliver.

MARINE-BASED FLORA AND FAUNA

As no suitable basis was identified for assessing the state of marine flora and fauna, the current state of marine biodiversity was assessed by reference to coastal and estuarine SSSIs. Coastal and estuarine SSSIs have been included within the examination of limits for terrestrial biodiversity above and in Figure 4.6.

LANDSCAPE AND TRANQUILLITY

No suitable indicator for assessing the current state of the landscape in the Haven Gateway was identified. Rather than omitting landscape entirely from the case study, it was decided to utilise available data on one particular aspect of the landscape, its tranquillity.

Although not identified as an environmental asset during earlier stages of this study, research shows that tranquillity is an aspect of the countryside particularly valued by the public.[51,52] The Campaign for the Protection of Rural England has recently updated a study which maps the areas of land in England disturbed by development. The resulting 'intrusion maps' show the countryside which is close enough to towns and cities and major infrastructure such as roads, airports and power stations to be significantly disturbed by visual and noise pollution. The areas of intrusion shown depend on the distances from various disturbing factors. [53]

The CPRE intrusion data has been incorporated as a limit map in the environmental capacity GIS tool (**Figure 4.7**). Areas of unacceptable tranquillity are defined as those:

Within 3 km of:

- very high disturbance roads including most major motorways and A roads with over 75000 vehicles daily;
- the edge of large towns (e.g. size of Southampton, Liverpool);
- power stations;

Within 2 km of:

- high disturbance roads including sections of some motorways and many urban A roads with 25,000 to 75,000 vehicles daily;
- of the edge of smaller and medium sized towns;

Within 1 km of

- medium disturbance roads including many urban A roads and some rural A roads with 10,000 to 25,000 vehicles daily;
- the published noise contour for airports;

Within 0.5 km of:

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[51] 'Landscapes in Britain', MORI; survey conducted 15-20 January 2004 on quota sample of 2031 adults [SSE/18/a Appendix 5].
[52] YouGov poll for CPRE, 27-29 September 2006.
[53] CPRE (2007) Intrusion: England's fragmented countryside.
http://www.cpre.org.uk/campaigns/planning/intrusion

- relatively low disturbance roads including many rural A roads with 5,000 to 10,000 vehicles daily;
- settlements of 2,500 to 4,000 people;
- mainline railways;
- major power lines or active windfarms;
- active mines and quarries.

In the absence of an analysis of limits in respect of landscape character, the landscape character areas within the Haven Gateway have been included for information only, using data supplied by The Landscape Partnership. A further landscape information layer was added to display landscape designations, namely AONBs and Heritage Coast. These are shown as information layers that can be toggled on or off within the interactive GIS map and are included in **Appendix 4**. In common with other information layers, these layers do not contribute to the scores used to generate the cumulative limits map.

As already indicated, defining what is acceptable or unacceptable with respect to landscape is very difficult as its value is highly subjective and measurement is restricted to characterisation rather than condition assessment. The approach taken here to concentrate on tranquillity as a single, measurable characteristic of the landscape was clearly highly simplistic.

In addition, most of the criteria which define intrusion (the inverse of tranquillity) are proxy measures, being based on proximity to particular types of major settlement or infrastructure, the exception being the noise contour for airports. Although these proxies will generally give a good indication of the sources of visual and noise intrusion to countryside tranquillity, they take no account of specific design features of developments which may mitigate these. Tree planting or green roofs, for example can help to reduce the visual impact of new buildings while earth bunds and vegetation can help to block the noise of industrial operations such as mining from the surrounding area.

OPEN SPACE

Open space provision should be defined both in respect of the social benefits that accessible open space provides to people and in terms of its environmental regulation functions, such as mitigation of flood risk, which indirectly benefit society. This study addresses the state of the environment relative to limits rather than social provision and should therefore logically focus on the environmental services supplied by open space. Earlier stages of this project were, however, unable to define the amount of open space that will deliver desired levels of environmental regulation due to the complexity of these functions and the lack of readily available data. Rather than exclude open space entirely, the Haven Gateway pilot study therefore restricted itself to the social benefits of accessible open space.

Various standards exist to define acceptable levels of open space provision, for instance those in the London Plan or set by Fields in Trust (FIT). National planning policy states that standards for access to open space are best set locally, taking account of differing

circumstances such as demographic profile and the extent of built-up area.[54] The Haven Gateway Partnership is currently formulating its Accessible Natural Greenspace (ANG) strategy for Haven Gateway with the assistance of the Landscape Partnership and the open space accessibility standards arising from that study were therefore used in this Environmental Capacity study. These accessibility criteria were developed by the Landscape Partnership in consultation with their project steering group, based on the Town & Country Planning Association (TCPA) ANG standards, having regard to other ANG standards. The maximum specified distances which people should be from natural greenspace sites of various sizes are as follows:

- 300m for sites larger than 2ha ('Local Sites')
- 1.2km for sites larger than 20ha ('District Sites')
- 3.2km for sites larger than 60ha ('Sub-regional Sites')
- 10km for sites larger than 500ha ('Regional Sites')

Grid squares which are within any one of these catchment areas have been classified as having an acceptable level of natural greenspace provision, the remainder being classed as unacceptable.

These data only define areas with access to *natural* greenspace, that is sites which have an area which is managed for biodiversity. Other types of open space such as areas managed purely for formal recreation are therefore omitted.

Comparisons with other parts of the country are hindered by the local nature of the criteria used to define accessibility. For instance, the commonly used Natural England ANG standards only require that people be within 2.0 km of district sites.

HISTORIC ENVIRONMENT

Data were obtained from the English Heritage (EH) Buildings at Risk (BAR) register showing the location and condition of Grade I and II* listed buildings in Haven Gateway. If a 1km grid square contained a building at risk it was plotted as 'unacceptable' while cells containing Grade I and II* listed buildings not at risk were plotted as 'acceptable'. It should be noted, however, that the BAR register uses quite specific criteria for selection and is not comprehensive, for instance Grade II buildings are only featured if they are also Scheduled Monuments. The Listed Building at Risk data is for grades I and II* buildings only. This data is collected by English Heritage, but represents only about 7% of listed buildings. These highly graded buildings are often iconic, churches or Martello towers, but do not provide a strong representation of the wider contribution that listed buildings [commonly grade II] make to the character of settlements and landscape. Further data on grade II BAR is collected by some local authorities, but not consistently. The additional resources which would have been needed to collate and translate these further datasets into a suitable format prohibited their inclusion in the case study.

In addition, a spatial representation of heritage features within the Haven Gateway was produced for information, using data supplied by English Heritage, Natural England and the

[54] CLG (2002) Planning Policy Guidance 17: Planning for open space, sport and recreation

National Trust for the Stage 1 Report. This is shown as an information layer that can be toggled on or off within the interactive limits map (see **Appendix 4**). In common with other information layers, this layer does not contribute to the scores used to generate the cumulative limits map.

Stage 2 of this project was unable to identify a suitable environmental limit against which the current state of the Historic Environment in the Haven Gateway could be assessed. Although it was agreed with the Steering Group during Stage 3 that use of Buildings at Risk would be preferable to no analysis for the Historic Environment, this dataset clearly portrays a very incomplete picture. BAR have been selected because data is available and can be mapped using the grid but they do not have a strong relationship with spatial planning decisions. Although some BAR might be due to bad development, for example a building blighted by a flyover, more commonly it has to do with problems of re-use/building type, maverick owners or local economies in need of regeneration. Increased economic activity generally assists bringing problem buildings back into use.

OTHER CONTEXTUAL SPATIAL DATA

A further spatial dataset deemed useful to a consideration of environmental limits and capacity for development was the location of flood risk areas. This layer is shown in **Appendix 4** and as an information layers that can be toggled on or off within the interactive limits map. In common with other information layers, this layer does not contribute to the scores used to generate the cumulative limits map.

APPENDIX 4

HAVEN GATEWAY INFORMATION LAYERS

Environmental Capacity in the East of England: Final Report

Soilscapes information layer

Key

- Fen peat soils
- Freely draining lime-rich loamy soils
- Freely draining slightly acid but base-rich soils
- Freely draining slightly acid loamy soils
- Freely draining slightly acid sandy soils
- Lime-rich loamy and clayey soils with impeded drainage
- Loamy and clayey floodplain soils with naturally high groundwater
- Loamy and clayey soils of coastal flats with naturally high groundwater
- Saltmarsh soils
- Sand dune soils
- Slightly acid loamy and clayey soils with impeded drainage
- Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils
- sea
- water
- Haven Gateway sub-region
- 1km Grid Squares

N W E S

0 3 6 12 Km

Source:
Soilscape Units developed by the National Soil Resources Institute

Date: 14/01/2008

Revision: A

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Environmental Capacity in the East of England: Final Report

Landscape designations information layer

Key

- Haven Gateway sub-region

Area of Outstanding Natural Beauty

- Dedham Vale
- Suffolk Coast and Heaths

Heritage Coast

- Suffolk Heritage Coast
- 1km Grid Squares

Mid Suffolk District

Suffolk Coastal District

Ipswich District

Babergh District

Tendring District

Colchester District

BURY ST EDMUNDS
STOWMARKET
FRAMLINGHAM
SAXMUNDHAM
WICKHAM MARKET
IPSWICH
SUDBURY
FELIXSTOWE
HARWICH
HALSTEAD
COLCHESTER
WIVENHOE
BRAINTREE
FRINTON-ON-SEA
BRIGHTLINGSEA
CLACTON-ON-SEA
WEST MERSEA
WITHAM
MALDON

N W E S

0 3 6 12 Km

Source: Natural England

Date: 14/01/2008
Revision:A

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Environmental Capacity in the East of England: Final Report

Historical assets information layer

Key

- Haven Gateway sub-region
- Listed Buildings
- Historic Park and Garden
- National Trust Owned Land
- NMR Monuments (Archaeological)
- Scheduled Ancient Monument
- Ancient Woodland
- Urban survey report undertaken
  - Dedham
  - Harwich
  - Manningtree
  - St Osyth
  - Wivenhoe
- Urban Archaeological Database report undertaken
  - Colchester
- Historic towns requiring careful consideration when planning future development per Council for British Archaeology list, 1965

Colchester	Manningtree
Dedham	Mistley
Hadleigh	Orford
Harwich	Wivenhoe
Ipswich	Woodbridge

N W E S

0 3 6 12 Km

Source: English Heritage
Natural England
National Trust

Date: 14/01/2008
Revision: A

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Environmental Capacity in the East of England: Final Report

Flood risk information layer

Key

- Haven Gateway sub-region
- Flood Defences
- Flood Zone 3
- Flood Zone 2
- 1km Grid Squares

Mid Suffolk District

Suffolk Coastal District

Ipswich District

Babergh District

Tendring District

Colchester District

BURY ST EDMUNDS
STOWMARKET
FRAMLINGHAM
SAXMUNDHAM
LEISTON
ALDEBURGH
WOODBRIDGE
IPSWICH
SUDBURY
FELIXSTOWE
HALSTEAD
COLCHESTER
BRAINTREE
WIVENHOE
FRINTON-ON-SEA
CLACTON-ON-SEA
WITHAM

N
W E
S

0 3 6 12 Km

Source: Environment Agency

Date: 14/01/2008
Revision: A

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Environmental Capacity in the East of England: Final Report

Landscape character information layer

Key

- Haven Gateway sub-region
- 1km Grid Squares

Landscape Character Assessment

- Ancient Estate Farmland
- Clay Plateaux
- Coastal Farmland
- Coastal Ridges and Peninsulas
- Coastal Slopes
- Drained Estuarine and Coastal Marsh
- Estate Sandlands
- Plateau Estate Sandlands
- Plateau Farmland
- Rolling Estate Farmlands
- Saltmarsh and Intertidal Flats
- Shingle Ridges
- Urban
- Valley Floors
- Valley Sides
- Wooded Farmland

N W E S

0 3 6 12 Km

DRAFT

Source:
Suffolk CC
Date: 14/01/2008
Revision: A

LAND USE CONSULTANTS
ENVIRONMENTAL PLANNING, DESIGN AND MANAGEMENT

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