WYG Planning & Design
part of the WYG group

Bristol City and South Gloucestershire Councils

AVONMOUTH AND SEVERNSIDE INTEGRATED DEVELOPMENT, INFRASTRUCTURE AND FLOOD RISK MANAGEMENT STUDY

February 2012

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Executive Summary

Bristol City and South Gloucestershire Councils have set out a strong vision for the economic development of the Avonmouth/Severnside area (see plan of study area on page 3 and at Appendix 1). The objective is to ensure that the area remains an internationally significant industrial location that attracts business and provides substantial employment. The Councils want to ensure a positive approach to planning and investment in infrastructure that will unlock the area's full potential. This report and the separate report "Avonmouth Severnside Outline Development Strategy" seek to set out a positive way forward to unlock the area's full potential.

Although current planning policies take a cautious approach to the area's development potential to 2026 and beyond, the Councils' ambition is for substantial economic development in the study area. The current development plans for the area acknowledge the challenges that the area faces and seek to encourage solutions that will ensure that the area remains an important business location.

This report seeks to identify and explore the challenges to the area's development and to identify a viable way forward that will ensure that existing infrastructure and development in the area remains sustainable and that the area achieves its full potential. It explores the key challenges of:

- flood risk;
- ecology; and
- transport; and

sets out opportunities for addressing these.

The report also explores the planning history and policy background in the study area and other challenges including the presence of hazardous installations, heritage and archaeology and landscape. The desire to ensure that the area is able to fulfil its economic development potential will inevitably require a careful balancing of some of these issues with the need to bring forward economic development.

Our conclusions in respect of the study area's development potential are that:

- the continuing economic development of about 350 ha of green field land within the 57/58 planning permissions could generate significant employment opportunities in the area;
- the development of a further 60ha of green field land within the study area could be feasible;

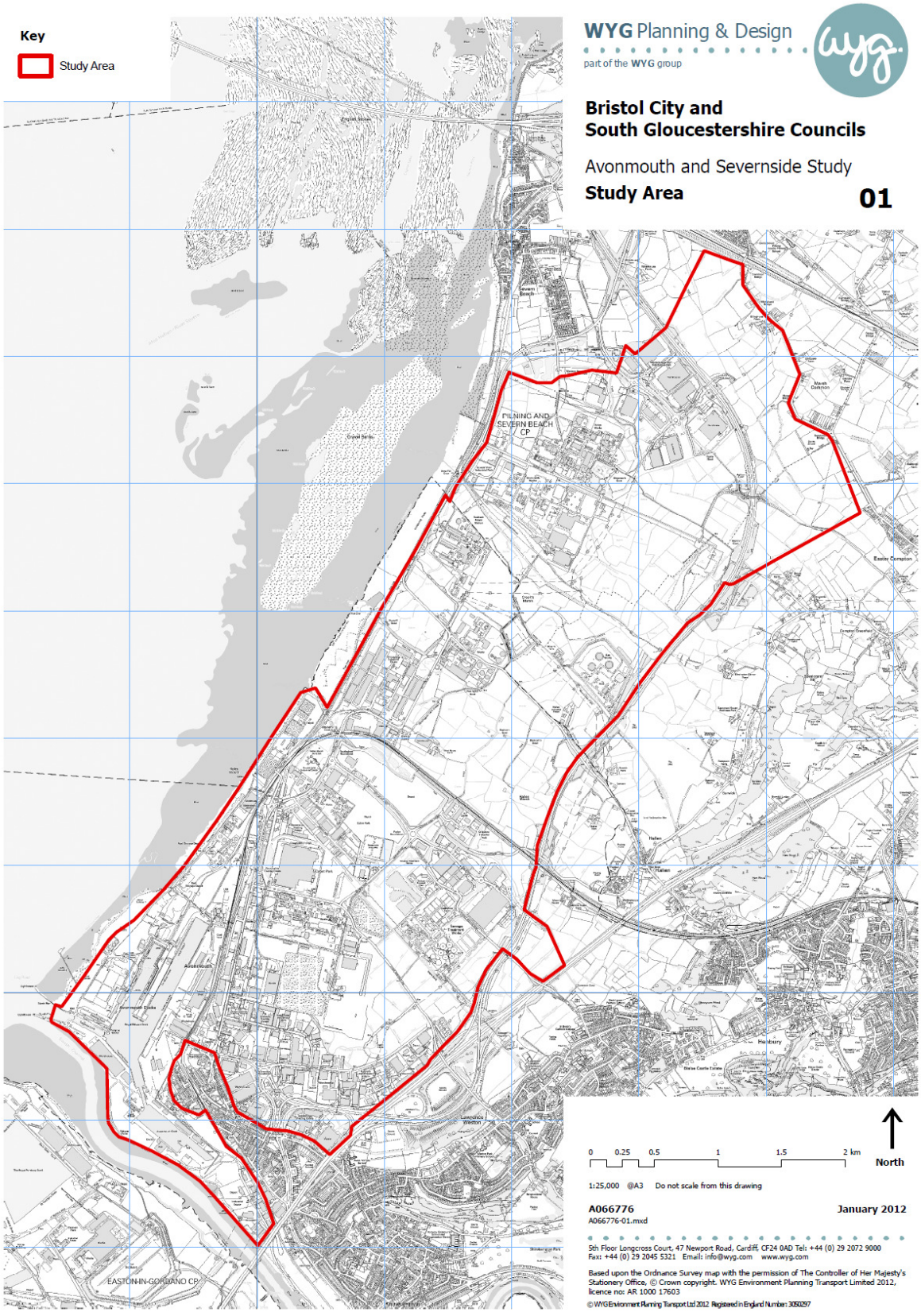
- however it will be necessary to reduce the increasing risk of (tidal) flooding within the area at an estimated cost of £59.8million to facilitate the area's economic development and to better protect existing development and infrastructure;
- it will also be necessary to mitigate the impacts of development on the area's important ecology by setting land in the area side for habitat enhancement at a cost of about £5 million;
- the Councils also wish to see the development of a new junction on the M49 to enhance the area's attractiveness for business and to mitigate the transport impacts of development in the area;
- a comprehensive approach to dealing with the area's challenges is important to avoid piecemeal development that increases the risk of flooding elsewhere, harms the area's ecology and has an adverse impact on the area's transport infrastructure;
- further detailed studies will be required to confirm details and costs of the flood defence, transport and ecology options, including, if appropriate, proposals for the phasing of those options.

If the existing challenges are addressed in the period to 2050, there is the potential to bring forward sustainable economic development that could provide:

- more than 60 ha of additional green field land for economic development;
- more than 1.1 million square metres of floorspace for B1 (excluding offices), B2, B8 and sui generis uses on green field and previously developed land;
- associated new employment opportunities that are assessed in the separate Avonmouth Severnside Outline Development Strategy report;

with investment in appropriate infrastructure and mitigation solutions with costs that depend on the options chosen.

Finally, a separate section of the report examines the area's potential for district heating. There is considerable potential for heat generation within the area and a number of potential heat anchors that could serve to attract potential occupiers with a high heat or cooling demand and the development of a district heating system. However, the opportunity to develop a district heating system will depend on the demand for heating and cooling from end users.


Key
Study Area
WYG Planning & Design
part of the WYG group
Bristol City and
South Gloucestershire Councils
Avonmouth and Severnside Study
Study Area
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1.0 Introduction

1.1 The Opportunity

1.1.1 The study area is of huge importance to the economy of the region and beyond. It accommodates a wide range of businesses, particularly in the areas of storage and distribution and energy and waste. It also includes Bristol Port that has proposals to expand with the development of a new Deep Sea Container Terminal. About 14,000 people are employed in the area and it accommodates infrastructure (including energy generation, sewage treatment, waste processing, liquid natural gas storage and distribution networks of pipelines and cables) that is of economic importance to a wide area.

1.1.2 However, the area's development potential is challenged by a variety of factors including:

- an increasing risk of flooding, particularly tidal flooding;
- limited motorway connectivity, despite the proximity of the motorway network;
- ecological designations of European significance; and
- extant planning permissions granted in 1957/58 that could lead to development of much of the Severnside area without the infrastructure that could help deliver an optimum solution.

1.1.3 These factors need to be addressed to help ensure that the area is able to meet its full potential. The Councils recognise the need to work together and with other stakeholders (including the Local Enterprise Partnership (LEP), land owners and businesses) to effectively accommodate the demand for economic development in the area. This report therefore seeks to set out how these factors could be addressed to enable the area to retain its international significance. This report also examines the potential cost of addressing the challenges.

1.1.4 A separate report "Avonmouth Severnside Outline Development Strategy" illustrates how the costs of addressing the challenges could provide value for money.

1.2 WYG

1.2.1 WYG has been commissioned as the Lead Consultant to undertake this study on behalf of Bristol City and South Gloucestershire Councils.

1.2.2 WYG has provided technical advice to support this commission in respect of planning, transport and ecology and has been supported by the following consultants:

- Buro Happold – Flood Risk and District Heating; and
- Amion Consulting – Economic Appraisal and Funding.

1.2.3 This report brings together the various areas of technical work that have been undertaken by the study team to seek to identify an optimum development scenario for the study area in the period to 2050. An integrated approach is required to address the issues highlighted in paragraph 2.1.2.

1.2.4 The report seeks to set out the constraints that have hindered development in the area to date and to identify a comprehensive strategy for addressing those constraints. The strategy seeks to help bring forward the economic development of:

- previously developed land;
- the substantial parts of the area that already benefit from planning permissions; and
- additional green field land;

to enable the realisation of the area's full potential.

1.2.5 This report feeds into and should be read in conjunction with the separate report: "Avonmouth/Severnside Outline Development Strategy". Although this report identifies the current constraints to development and the costs to address these, the separate report considers the alternative options for realising the Vision and opportunity that the area provides and assesses the benefits and value for money of the elements of the Strategy.

1.2.6 This approach reflects the requirements of the Project Brief that focuses on seeking a solution to the challenges that have limited the area's development to date and that will continue to constrain its future unless they are met.

1.3 Location

1.3.1 The extent of the study area is shown in the plan at page 3 and Appendix 1. It comprises:

- Bristol Port and its associated storage and distribution activities;
- the Avonmouth and Severnside industrial and warehousing areas at the northern and southern ends of the area;
- a central agricultural area; and
- infrastructure including power generation, waste recycling and disposal industries, a sewage water treatment facility, gas storage facilities, electric and gas transmission equipment.

1.3.2 The study area excludes the residential area of Avonmouth in the south and this report therefore focuses on economic development rather than the existing residential development. Residential development has not generally been permitted within the study area to date and it is unlikely to comprise a significant element of any future development strategy. However, addressing the constraints to the area's economic development, including proposals to reduce the risk of flooding and improve transport links, will be of benefit to them too.

1.4 Infrastructure

1.4.1 The study area already includes substantial economic development and infrastructure. It comprises two main areas of economic development in the south (Avonmouth) and north (Severnside) of the area. Both areas predominantly comprise a mix of industrial, storage and distribution and sui generis uses.

1.4.2 The plan at Appendix 2 illustrates the extent of the developed parts of the study area and some of the infrastructure. The infrastructure installations within the area include:

- Bristol Port and its associated facilities;
- Seabank Power Station;
- wind turbines;
- Liquid Natural Gas (LNG) Plant;
- Sewage Treatment Works;
- passenger and freight railway lines;
- parts of the strategic highway network;
- waste treatment plants;
- surface water drainage infrastructure;
- overhead power lines;
- underground gas and oil pipelines; and
- formal and informal flood defences.

1.5 Challenges

1.5.1 Economic activity at Avonmouth and Severnside already makes a very substantial contribution to the economy of the Bristol and South Gloucestershire. It is important regionally and, in some respects, nationally and internationally. The area has seen considerable new development and redevelopment within recent years and there remains strong market/developer interest, including for very large format warehouse/logistics premises and for new recycling and energy projects.

1.5.2 The history of the area's development includes planning permissions that were granted in 1957/58 (the 57/58 permissions) for the development of the (then) ICI chemical works in the Severnside area. Further details of the area's planning history are outlined in section 3.0. However, at this stage, it is important to note that the 57/58 permissions remain extant and cover a substantial part of the Severnside area.

1.5.3 The area is however also the subject of significant environmental constraints including an increasing risk of flooding and its proximity to important nature conservation designations. The Councils are also concerned about the impact of additional development within the study area on transport infrastructure, the area's archaeological potential and its landscape value.

1.5.4 The area's constraints are reflected in current development plan policies that broadly seek to limit development to 2026 to a range of industrial, storage and waste uses involving the redevelopment of previously developed land together with an acknowledgement that much of the land that is the subject of the 57/58 permissions will continue to be developed for B2 and B8 uses.

1.5.5 The Councils would like to promote a more positive approach to the area's economic development. The Councils have therefore, as part of this study, adopted a Vision for the study area (see paragraph 1.7.2) that seeks, inter alia, to unlock its full potential.

1.5.6 This study therefore seeks to identify options for addressing the constraints to development in the area to help release its full economic development potential. It seeks to identify the need for infrastructure and mitigation to accommodate further development and to address the threats to the area's development, infrastructure and its economic potential.

1.5.7 The greatest challenge to the study area's economic development potential is the increasing likelihood that, with the impact of climate change, the area will be subject to an increasing risk from tidal flooding. The SFRA 2 commissioned jointly by the Councils notes that if the existing flood defences are not improved, the risk of an increase in the frequency and severity of flooding in the future is such that existing and planned development in the area is unlikely to be sustainable. In the absence of a comprehensive flood mitigation strategy for the area, the SFRA 2 modelling suggests that development in the area will become increasingly at risk of flooding. A viable and sustainable solution to address the risk of flooding in the study will therefore be an essential component of any strategy for realising the area's economic development potential.

1.6 Constraining Influence of Environmental Factors

1.6.1 The study seeks to set out options to address the constraining influence of environmental factors within the study area, principally the area's risk of flooding, its ecological importance and its transport infrastructure. The study also refers to hazardous installations and the area's heritage assets, including its historic landscape and archaeology.

1.7 The Brief

1.7.1 The Project Brief was prepared in consultation with officers within each Council and Natural England, the Highways Agency and Environment Agency.

1.7.2 Both Bristol City and South Gloucestershire Councils recognise the strategic importance of the area and have developed a draft joint Vision statement that sets out the key characteristics of the area to 2050:

An internationally significant industrial location, home to world-class companies operating in key sectors which are at the heart of the UK's economic future, including advanced engineering, green & environmental technologies, tidal power and transport & logistics.

Business will be drawn by investment opportunities and a reputation for innovation, competitiveness and superb infrastructure including a deep-water container terminal providing direct access to road and rail networks from the closest port to the UK population with 45 million people living within 300 kilometres.

Local people will benefit from employment opportunities through established pathways, linking business, agencies, universities, schools and colleges working together to provide a highly skilled, adaptable workforce that maximises the benefits of economic growth and inclusion.

Through a positive approach to development planning and public investment in infrastructure that will unlock the area's full potential, Avonmouth and Severnside will provide up to 7,500 new jobs[1],

helping to drive forward Bristol and the West of England as the UK's most competitive city region, generating a wide range of jobs and significant local economic benefits.

[1] An identification of the full potential developable area taking account of current core strategies but looking beyond the current plan period.

1.7.3 This Vision should be read alongside that set out in each Council's Core Strategy. The Vision in the emerging South Gloucestershire Core Strategy (http://www.southglos.gov.uk/NR/exeres/99affbab-2714-4578-9d10-886983548a6c) states:

Severnside will remain a strategically important location for employment uses. Employers, landowners and developers will work with the Council, and other agencies and Bristol City Council to unlock economic potential and improve local transport infrastructure. The Severn Estuary and adjoining floodplain is internationally important for a wide range of ecology and will be safeguarded and maintained. Its archaeological heritage and interest will also be protected and conserved and a network of new nature reserves will be implemented. A longer term durable and robust strategy for addressing flood risk due to climate change will be adopted. The area's potential for power generation will be managed.

1.7.4 The Vision for the Avonmouth area in the Bristol Core Strategy as adopted in 2011 (http://www.bristol.gov.uk/page/planning-core-strategy) states:

Avonmouth will maintain its status as a regionally important industrial and warehousing business location.

- *The key economic sectors of environmental technologies, distribution and logistics, advanced engineering and aerospace and manufacturing will be encouraged.*
- *There will be an expanded role for the Port.*
- *Development will be carefully managed to avoid increased flood risk.*
- *Internationally important biodiversity will be safeguarded.*

1.7.5 The Vision in the Project Brief sets a more positive tone for the area's future economic development than the Visions in each Core Strategies that look forward to 2026 rather than 2050.

1.7.6 The Project Brief indicated a desire for both Councils to pursue a bid to the Regional Growth Fund and to create an Accelerated Development Zone (ADZ) and Tax Increment Funding (TIF) proposal to bring forward the further development of the area for key industries and enable the attendant mitigation and infrastructure. This study was intended to underpin these proposals and to:

- identify the optimum/appropriate balance between addressing constraints (and the mitigation costs);

  versus

- the economic benefits and employment potential of the whole Avonmouth Severnside area.

1.7.7 The broad requirements were to:

- identify the net developable area to 2050 (derived from an analysis of the constraints);
- provide an assessment of the employment potential of the area for B2/B8 uses derived from CLG guidance/ratios and the net developable area identified in the study;
- undertake a market assessment of the area's development potential;
- undertake an initial assessment of the full potential benefit of such development;
- identify ecological mitigation, flood defence, accessibility and other infrastructure locations and costs, using and the potential developable area each would 'unlock';
- assess the most economic scale and scope of development and a phased implementation plan;
- draft a cost/benefit analysis derived from the above; and
- develop a recommendation as to the scale and scope of development based on the above factors.

1.7.8 The bulk of the work was intended to be desk-based, secondary research. The brief noted that much of this work had already been undertaken but required a desktop review to identify interrelationships and timing and phasing issues and any critical gaps in information.

1.7.9 The study has been undertaken in parallel with separate technical reports being prepared by other consultants about the area's flood risk and ecology (see sections 1.8 and 1.9 below). We have relied on the information within these emerging reports in undertaking this study.

1.8 Strategic Flood Risk Assessment – Level 2 (SFRA 2)

1.8.1 A Strategic Flood Risk Assessment – Level 2 (SFRA 2) was commissioned by Bristol City and South Gloucestershire Councils and the Lower Severn Drainage Board and was published by the Councils at the end of March 2011 (see: http://www.southglos.gov.uk/_Resources/Publications/PTE/11/0200/PTE-11-0072 or http://www.bristol.gov.uk/page/strategic-flood-risk-assessment-sfra). The SFRA 2 comprehensively sets out the flood risk issues affecting the study area and options for mitigating that risk.

1.9 Severnside and Avonmouth Wetland Habitat Project

1.9.1 Cresswell Associates (Hyder) was commissioned by Bristol City and South Gloucestershire Councils and Natural England to prepare a report about the impact of planned development in the study area on its ecology – the Severnside and Avonmouth Wetland Habitat Project Stage 2: Review of Consent at Severnside and Assessment of Avonmouth Development Proposals, but this report has not yet been published.

1.9.2 We have however taken into account the findings of a draft version of the Report (issued in November 2010) and a more recent draft summary of this study (issued in December 2011). The draft Report identifies the potential impacts of planned developments in the area on its ecology and considers options for mitigating those impacts. In particular, it recommends that the feasibility of

habitat creation/enhancement works at the potential mitigation sites should be subject to further investigation.

1.10 Methodology

1.10.1 Our broad methodology for undertaking this study was to:

- review the area's planning history and current and emerging planning policies;
- assess the extent to which current planning policies facilitate development within the study area;
- examine existing data sources to identify constraints to development within the study area;
- map those constraints to identify potential sites to accommodate new development;
- identify opportunities and options to overcome the constraints;
- identify opportunities for economic development within the area;
- review the benefits and costs of the options; and
- examine opportunities for securing funding for the options and the next steps to bringing them forward.

1.11 Structure of Report

1.11.1 This report is structured to:

- review the area's recent history of development;
- examine current and emerging development plan policies;
- identify the nature and scale of the challenges facing the area; and
- identify opportunities to address those challenges by developing infrastructure or implementing mitigation schemes.

1.11.2 A separate report (Avonmouth/Severnside Outline Development Strategy) examines opportunities for funding the infrastructure and mitigation that will be required to bring forward the area's continuing economic development.

1.11.3 The need to address the challenges is extremely important not only to potentially release additional land for development to promote the area's economic potential, but also to ensure that both existing and current planned development within the study area is sustainable to 2050 and beyond.

1.12 Costs

1.12.1 The cost estimates in this report are based on a number of assumptions, some of which are outlined in this report. At this stage, the cost estimates are not based on detailed proposals for the identified infrastructure/mitigation measures. Further analysis of the costs of the infrastructure will be required as detailed proposals for infrastructure and mitigation measures are developed and options are tested by the Councils and their strategic partners moving forwards.

1.12.2 It should also be noted that the costs focus on the potential initial capital costs of developing the infrastructure and do not take into account future maintenance, repair or replacement costs.

1.12.3 This report focuses on the options that are set out in existing studies, but there may be other lower (or higher) cost options that may be capable of addressing the infrastructure requirements in the area.

1.13 Land Ownership

1.13.1 The land within the study area is in multiple ownerships. However, the plan at Appendix 3 shows that much of the area is within the ownership of Bristol City Council, Bristol Port and Aviva (although it is understood that this land is now owned by Severnside Distribution Limited). In particular, much of the central, undeveloped part of the study area that is within agricultural use is within Bristol City Council's ownership.

1.13.2 The diverse land ownership of the study area means that any co-ordinated strategy for the area's future development will require the engagement and co-operation of many of these land owners. This is recognised in particular in South Gloucestershire Council's Core Strategy in the context of the 57/58 permission.

1.13.3 There is a significant risk that land ownership issues will challenge a comprehensive strategy for the area's development. The Councils (and other agencies with such powers) may therefore need to consider the opportunity to use compulsory purchase powers to implement a strategy for the area's comprehensive development where infrastructure/mitigation works are required on land outside their ownership, or the benefits of a co-ordinated approach are at risk of not being delivered.

1.14 Consultation

1.14.1 This report and the associated technical appendices have been prepared following consultation on a number of the technical issues that have been analysed in our work.

Workshop

1.14.2 A workshop attended by representatives from each Council, the Highways Agency and Natural England was held in January 2011. A summary of some of the key points arising from that workshop is attached at Appendix 4.

Environment Agency

1.14.3 Separate meetings have been held with representatives from the Environment Agency. Notes of those meetings and correspondence with the Environment Agency are attached at Appendix 5.

HSE

1.14.4 An informal discussion was held with a representative from the HSE to establish the implications of the COMAH consultation zones and the implications for the area's future development. The discussion highlighted the HSE's use of the PADHI, their land use planning methodology. This methodology has been used to assess the possibility of development in proximity to hazardous installations within the study area.

Bristol Port

1.14.5 A separate meeting was also held with representatives from Bristol Port in February 2011. The purpose of this meeting was to seek further information about the Port's proposed Deep Sea Container Terminal that now has the necessary parliamentary approval to proceed. The Port's representative indicated at that time that it is intending to complete the DSTC in 2015.

1.15 Technical Reports

1.15.1 This report is accompanied by a separate technical study about flood risk (see Appendix 6) that has been used to inform the contents of this report. We have not summarised the findings in this report, but have drawn on its findings and the background research that informed it.

1.16 District Heating

1.16.1 The Project Brief also required an investigation into the feasibility of a district heating system in the study area. A separate technical report to address this section of the brief is attached at Appendix 7 and a summary response to the requirements of the brief is set out in section 13.0 of this report.

2.0 Planning History

2.1.1 The study area has developed for port, infrastructure, industrial, warehousing, waste disposal and processing and other uses over the last century, with most development taking place beyond the port in the latter part of the twentieth and early twenty first century.

2.1.2 The plan and schedule at Appendix 8 illustrates the sites that benefit from extant planning permissions and sites where applications have been submitted but (as of 28th February 2011) had not been determined by the Councils. The plan also shows the location of the Port's Deep Sea Container Terminal consent and the extent of the 57/58 planning permissions.

2.1.3 The planning history illustrates the extensive economic development that has been granted planning permission over this period. It includes the development of previously developed and green field land.

2.2 Avonmouth

2.2.1 Over the last 50 years, there has been a gradual shift in the area from heavy industry towards distribution and warehousing uses. More recently, there has been an increase in demand for low carbon energy generating and waste management facilities in the area. In the Avonmouth area around junction 18 of the M5, there has been a gradual introduction of various quasi-retail uses and retail trade operations and we anticipate that the pressure for such non traditional employment uses is likely to continue in that part of the area.

2.3 Severnside – the 1957/58 Permissions

2.3.1 The planning history of Severnside is dominated by outline planning permissions granted to ICI in 1957 and 1958 for about 750 hectares of land and an additional 450 hectares extending into the Severn Estuary. The extent of the land covered by the 57/58 permissions is shown in the plan at Appendix 8.

2.3.2 The permissions have been implemented and provide "in principle" consents for a wide range of land uses including:

- factories for the production of chemical and allied products;
- offices;
- warehouses and stores;
- canteens, clubs, hostels, training establishments, amenity and welfare buildings;
- sports pavilion and sports playing fields; and
- the construction of any buildings, structures, erections or engineering works expedient for, or ancillary to, the construction and operation of the factory (for the production of chemical and allied products).

2.3.3 The original intention of these proposals was to enable the development of a multi functional, self contained industrial complex to be operated by ICI. However a substantial proportion of the land covered by the original planning permissions has subsequently been sold and some has already

been developed, or is in the process of being developed, for predominantly warehouse and distribution uses.

2.3.4 The scope of the permissions has been the subject of challenges but it has now been established that they are valid and capable of ongoing implementation. The impact of these permissions is that the land covered by them may be developed for the variety of uses outlined above without the need for further planning permissions. This limits the Councils' ability to secure mitigation (including, for example, s106 contributions and the CIL) for the impacts of the development on this area through the planning system.

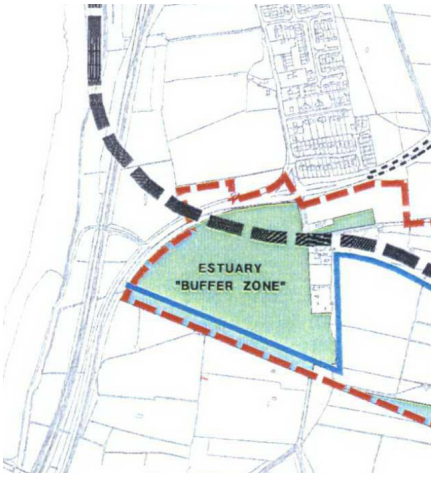
2.3.5 At present, the area covered by the 57/58 permissions is continuing to be developed mainly for warehouse and distribution uses.

2.3.6 For the purposes of this study, we have assumed that the 57/58 permissions will only be implemented insofar as they affect the area to the east of the existing flood defences and that they will not be implemented within the estuarine environment (see section 3.1.14 below).

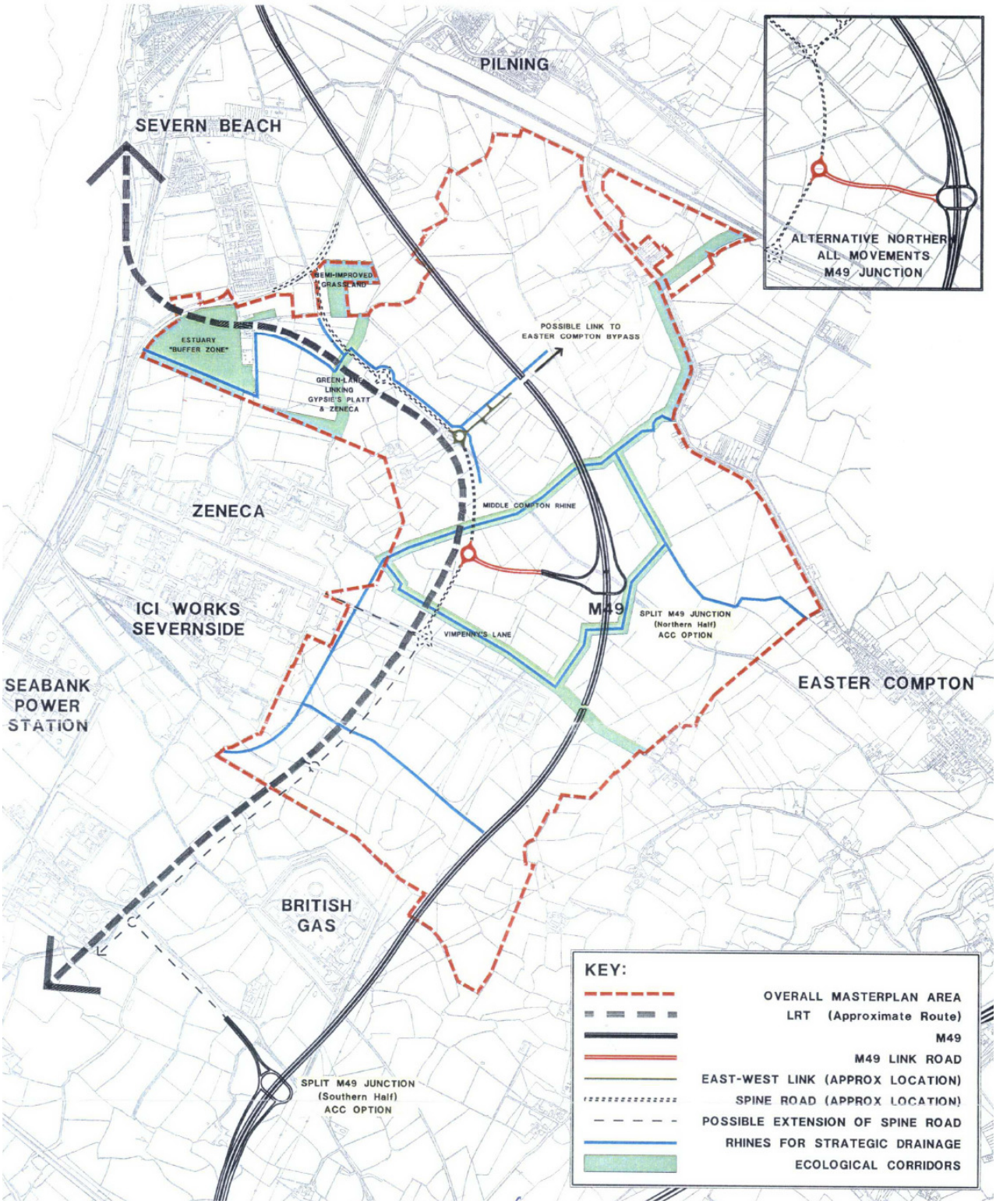
2.4 Western Approach Phase 1 (WAP 1) Development

2.4.1 Notwithstanding the existence of the 57 permission, prior to the testing of this in the courts, the landowner (ICI) of a substantial part of the area covered by these permissions (about 90ha) submitted an outline planning application to develop the WAP 1 as a distribution park for B8 uses under the reference P94/0400/8. It was granted permission subject to a s106 agreement (see Appendix 9) that:

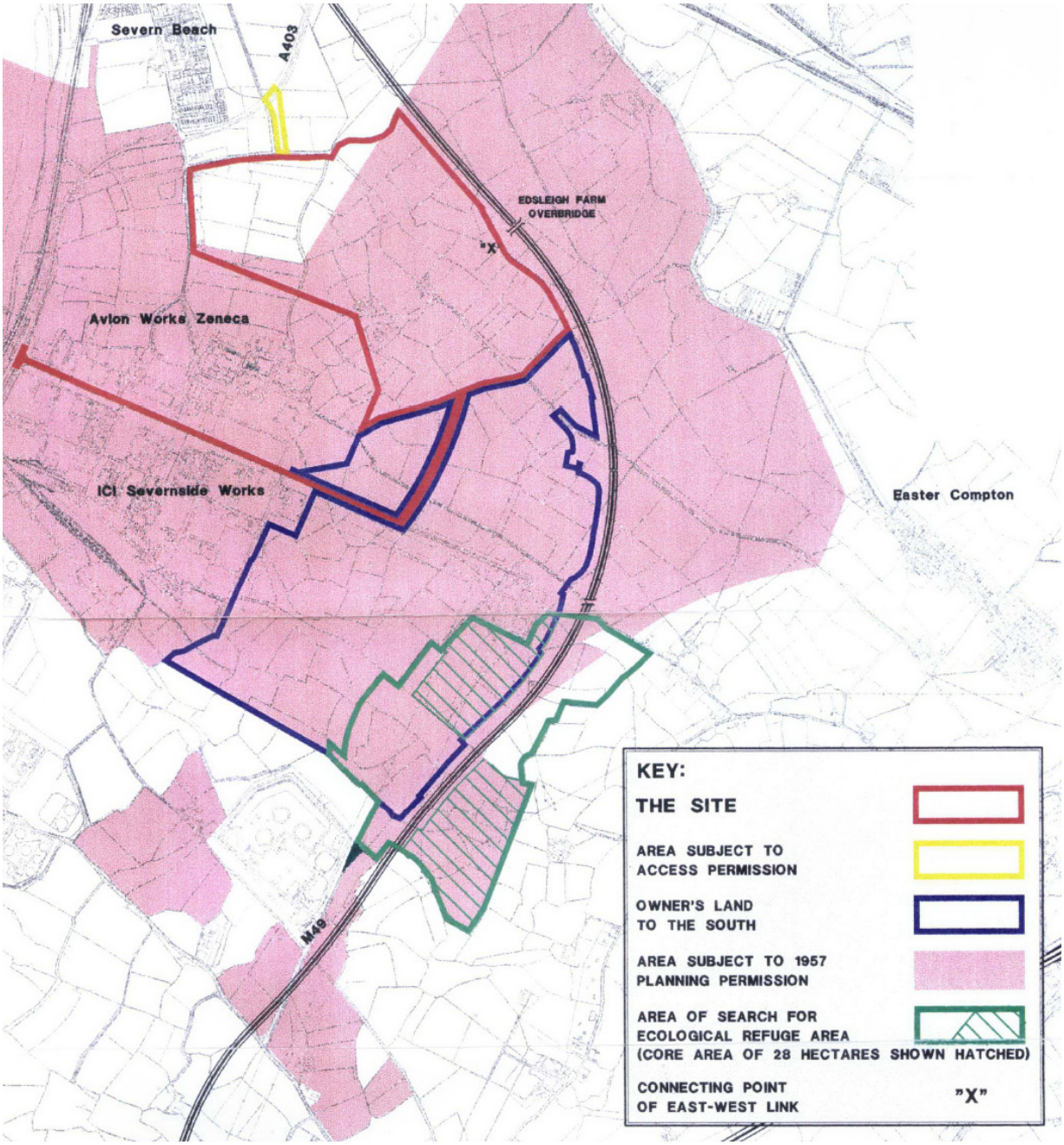
- includes areas for the provision of ecological mitigation;
- provides an option (until 2016) for the Council to complete the spine road and introduce a dual carriageway and LRT line through the site; and
- includes the "surrender" of the parts of the 57 permission that are to the west and north west of the A403 and within the area shown as an "estuary buffer zone" on the plan extract below:



2.4.2 The plans incorporated in the s106 agreement (see extract below) included options for a single M49 junction and separate north and south bound junctions and identified a potential road link to Easter Compton:



2.4.3 The WAP 1 s106 agreement also includes the provision of a 38 ha area as a "nature sanctuary" within the area edged green (with a core area of 28 ha hatched green) on the plan extract below (and on the plans at Appendix 10):



2.4.4 Subsequent reserved matters applications include details of the "spine road" that runs through the WAP 1 site. The road has been designed for dualling at a later date. It therefore occupies a corridor with a width of about 100 metres (to allow for landscaping, drainage and carriageways).

2.4.5 This permission was linked to work at that time by the former Avon County, Bristol and Northavon Councils who published an Interim Draft Avonmouth/Severnside Development Strategy for "*informal consultation*" in 1994. The aim of the Strategy was to "*facilitate the co-ordinated development of Avonmouth/Severnside and to safeguard and enhance the environment*". The purposes of the Strategy included the provision of a "*coherent framework for the phasing of development over the next 20 to 30 years, building on the economic and environmental opportunities of the area*" and to "*establish, in general, requirements and responsibilities for infrastructure provision and site planning*".

2.4.6 At the time that the Strategy was in preparation, it was anticipated that, in addition to the development of the land covered by the 57/58 permissions coming forward, substantial additional areas of land would be brought forward.

2.4.7 For the purposes of this study, we have assumed that the WAP 1 permission has been implemented and that the provisions of the s106 agreement remain in force. In particular, we have assumed that the s106 agreement associated with that permission:

- removes the opportunity for the development of land within the estuary itself under the terms of the 57/58 permissions;
- restricts development within the 28ha core area of the ecological refuge area; and
- requires 38ha of ecological mitigation (including the 28ha core area) within the area shown on the plan at paragraph 2.4.3 and plans at Appendix 10 as part of the development and that this will be brought forward within the next 5 years.

2.4.8 The effect of the planning permission and s106 agreement is therefore to significantly reduce the extent of the area available for B1, B2 and B8 development under the 57/58 permissions (see plan at Appendix 8 that shows the extent of the 57/58 permission as it originally extended into the estuary).

3.0 Planning Policy Context

3.1 The Development Plan

3.1.1 Decisions on planning applications should be made in accordance with the development plan unless material considerations indicate otherwise. The development plans for the study area therefore set the scene for its future economic development in the short term.

3.1.2 In the longer term (i.e. to 2050), if the Councils' are to achieve their vision that is set out in the Brief for this project, current development plan policies will need to be revised to facilitate further development.

3.1.3 At present, the development plans for the study area comprise the:

- Regional Planning Guidance 10 (the Regional Strategy for the area although the government has indicated its intention to abolish such Strategies) at http://www.swcouncils.gov.uk/media/SWRA/Transport/RPG10Fulltext.pdf;
- "saved" policies in the Joint Replacement Structure Plan at http://www.westofengland.org/media/60848/adoptcomp.pdf;
- "saved" policies in the Bristol (http://www.bristol.gov.uk/page/planning-local-plans) and South Gloucestershire (http://www.southglos.gov.uk/NR/exeres/28f7a303-cfec-48f2-84d9-71603e6650f8) Local Plans;
- Bristol Core Strategy (http://www.bristol.gov.uk/page/planning-core-strategy); and
- Joint Waste Core Strategy (http://www.westofengland.org/waste/planning/adopted-joint-waste-core-strategy).

3.1.4 Furthermore, although South Gloucestershire Council's Core Strategy (http://www.southglos.gov.uk/NR/exeres/99affbab-2714-4578-9d10-886983548a6c) has not yet been adopted, it does illustrate the Council's current intentions in respect of the study area.

3.2 Policy Changes

3.2.1 The planning policy background to this study has changed significantly since it was commissioned. In particular:

- the government has re-affirmed its intentions to abolish regional strategies (including Regional Planning Guidance 10 (RPG10));
- the government has published a Draft National Planning Policy Framework that will lead to the replacement of current Planning Policy Guidance and Statements;
- the Councils, with others in the former West of England area, have adopted a Joint Waste Core Strategy (JWCS) that allocates 7 previously developed sites for residual waste treatment facilities within the study area;

- Bristol City Council has adopted its Core Strategy that sets out its vision for the future development of Avonmouth which states that: "*Avonmouth will maintain its status as a regionally important industrial and warehousing business location*"; and
- South Gloucestershire has submitted is Core Strategy for independent examination (although progress on the examination has been delayed).

3.3 Implications of Change

3.3.1 The key implication of the ongoing changes to policy and funding options mean that this report must be understood in the context of its publication date. After this date, further policy, legislative and evidence changes could have significant implications for the "right" approach to pursuing both Council's economic and other development objectives for the study area.

3.3.2 For the purposes of this study, we have assumed that the adopted Bristol and emerging South Gloucestershire Core Strategy policies that will govern development proposals in the study area will remain in place until at least 2016. Substantial revisions to the Core Strategies are unlikely to be adopted in advance of 2016.

3.3.3 The following sections examine the most important development plan documents in the study area in more detail. In particular, we have focused on the Bristol and South Gloucestershire Core Strategies that set out each Council's current (or emerging) planning policies for the area's development.

3.3.4 Although the brief for this study requires that we look forward to 2050, current development plan policies for the study area are an important starting point for reviewing the area's development potential.

3.4 RPG10

3.4.1 RPG10 is the Regional Strategy for the study area. However, the government has confirmed its intention to abolish Regional Strategies and therefore little weight is given to RPG10 (and the previously issued draft Regional Strategy) in this study.

3.5 Joint Waste Core Strategy (JWSC)

3.5.1 The JWCS covers the West of England area and includes the study area. The Strategy allocates 7 sites for development within the study area for residual waste treatment facilities and these are shown on the plan at Appendix 10. The combined area of the allocated sites is more than 100ha. The majority of the allocated sites comprise previously developed land.

3.5.2 The JWCS highlights the need for detailed proposals for the development of each site to incorporate flood and ecology mitigation measures.

3.6 Joint Replacement Structure Plan

3.6.1 The Joint Replacement Structure Plan for the area was adopted in 2002. Although the Structure Plan policies were only intended to run until the end of March 2011, they remain part of the statutory development plan for the area.

3.6.2 The Structure Plan noted that:

"*realising the full economic potential of the area will require Bristol and South Gloucestershire, in conjunction with other agencies, to prepare a joint strategy for the comprehensive development of the whole area which clearly links land use developments to an agreed transport infrastructure and its funding.*"

3.6.3 The Structure Plan focuses on the transport and other environmental constraints in the study area and notes that:

- the area lacks the public transport infrastructure which could prevent congestion arising, and studies suggest that there would be substantial and probably prohibitive costs in providing and running such a system;
- agreement on the funding of a new M49 junction and improvements to the local road network, particularly a realigned A403, will be essential prerequisites to realising development potential in the study area;
- the area's development could impact on nature conservation interest; and
- flood risk needs to be addressed.

3.6.4 Policy 14 in the Structure Plan envisaged that development plan policies would, inter alia, make provision for:

- the construction of the M49 Intermediate Junction;
- a Spine Road linked to the M49 junction between Avonmouth and Severn Beach and forming a realigned A403;
- the Kings Weston Lane links; and
- other necessary local improvements;

through development funding.

3.6.5 The Joint Replacement Structure Plan acknowledges the role of land in the study area in providing development opportunities for economic expansion in the short and long term.

3.7 South Gloucestershire Local Plan

3.7.1 South Gloucestershire Council's adopted Local Plan policies sought to realise Severnside's "*economic development potential*". The Plan recognises the area as a key strategic location of regional importance for a range of employment uses which require extensive areas of land and good links to the motorways, the rail network and dock facilities at Avonmouth.

3.7.2 Local Plan policies acknowledge the extant 57/58 permission and seek as far as possible within the limits imposed by those permissions to:

- safeguard sensitive areas of nature conservation importance in the estuary;
- protect the amenities of local communities; and
- control the phasing of development and require the introduction of public transport measures to ensure that traffic generated by development does not significantly exceed the capacity of the existing and improved road network and that alternatives to the private car are available.

3.7.3 In respect of transport in the study area, the Local Plan asserted that:

Current analysis indicates that an acceptable and comprehensive development at Severnside/Avonmouth will require three major road schemes, together with local road improvements.

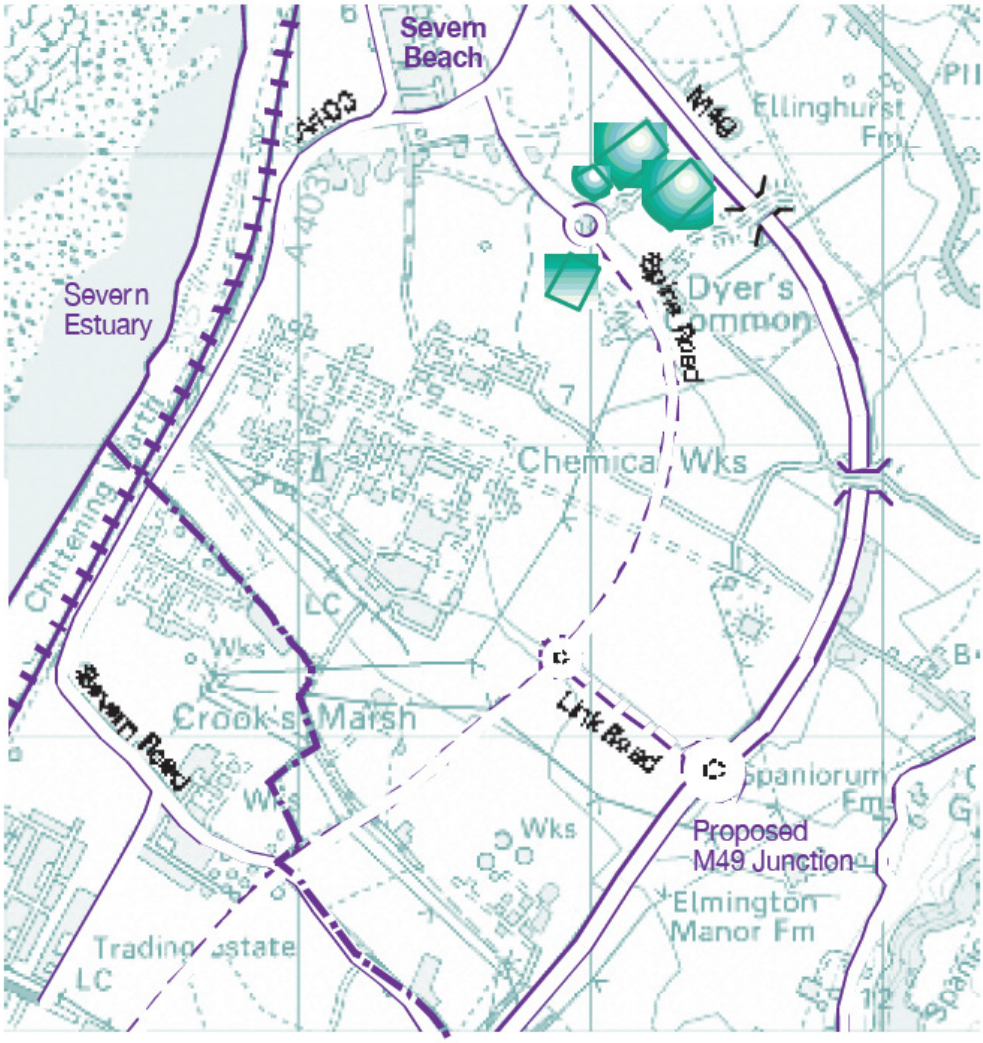
3.7.4 "Saved" Local Plan Policy E2 states that the requirements include:

- an M49 junction;
- a link road to the M49 junction;
- a spine road designed to link through the area to the south;
- other necessary local road improvements; and
- public transport improvements.

3.7.5 The Local Plan notes that the principle of the new M49 junction serving the large scale employment development at Severnside and Avonmouth was agreed at the parliamentary hearing into the Severn Bridges Bill and was reflected in a government publication in 1998 (although it should be noted that since that time, further development has taken place within the study area and other transport infrastructure improvements have been brought forward and are planned outside the study area).

3.7.6 A diagrammatic plan of the proposed transport improvements was included at Figure 7.8 in the Local Plan (see below). It shows a potential location for the M49 junction substantially further to the south than was indicated in the s106 agreement attached to the WAP 1 planning permission (see 3.1.17 above).

Figure 7.8 from the South Gloucestershire Local Plan



3.7.7 The Local Plan seeks to restrict the further development of the area beyond that in the 57/58 permissions as set out in "saved" policy E4 until a "*comprehensive development strategy*" is prepared during the Plan period. However, "saved" policy E2 does identify the majority of the land to the west of the M49 as being within an area where the Council is committed to realising its long term employment potential.

3.7.8 The areas covered by "saved" policies E2 and E4 are shown on the Proposals Map at: http://hosted.southglos.gov.uk/localplan/7side%20set/SEVERNSIDE%20inset.pdf. These areas include most of the study area that lies within the South Gloucestershire.

3.7.9 It is anticipated that "saved" Policies E2 and E4 will be superseded by the Core Strategy Policies in due course.

3.8 South Gloucestershire Core Strategy

3.8.1 South Gloucestershire Council's Core Strategy has been submitted to the Secretary of State for examination. The Strategy notes that although the area has extant planning permissions there are a number of constraints which affect its development potential, including:

- national and international nature conservation designations relating to the Severn Estuary.
- the risk of flooding from the River Severn due to breaching or overtopping of the existing flood defences, coupled with a rising tide level, as well as groundwater flooding;
- the limited capacity of the existing highway network and infrastructure in the area; and
- high archaeological interest in the Severn Levels.

3.8.2 South Gloucestershire Council is concerned that continuing development of individual land parcels outside of an overall agreed strategy or framework plan, without protection and mitigation of key interests, and without a degree of coordination, could cumulatively impact on addressing the key constraints identified above and in particular:

- could have a significant effect on the ecology and conservation assets of the Severn Estuary and cause significant and irreparable damage to estuarine and floodplain ecology and associated international designations;
- reduce flooding capacity without improvement to flood defences and increase the risk of flooding to third parties;
- damage the network of rhynes which provide the local drainage network and which are of ecological interest;
- worsen traffic congestion on the local road and motorway network; and
- result in the irretrievable loss of valuable archaeological assets.

3.8.3 The Council's overall desire is therefore to develop, in partnership with others, a Strategic Framework Plan for the area's development.

3.8.4 The emerging Core Strategy encourages joint working and cooperation between South Gloucestershire Council and landowners to overcome the constraints in and around the area. The Sustainability Appraisal (see: http://www.southglos.gov.uk/NR/rdonlyres/EA2CB997-6D66-4472-8A71-08B24CCAC008/0/PTE100060.pdf) notes that if these constraints are not overcome further employment development in the area could have negative sustainability impacts.

3.8.5 The SA notes that without the successful implementation of mitigation strategies outlined in the supporting text to the emerging Core Strategy policy about Severnside's future development, the implementation of the extant consents would have severe negative implications for the sustainability of the area, in terms of:

- the impact on biodiversity and natural habitat, and the associated national and international designations;
- the impact on both local highways network and strategic road infrastructure;

- the impact on and permanent loss of potential archaeology; and
- flood risk, which will worsen as climate change increases throughout the plan period and beyond.

3.8.6 The Core Strategy's conclusions in relation to the land covered by the 57/58 permissions apply to the development potential of other land within South Gloucestershire Council's area that is not covered by those permissions.

3.8.7 Draft Policy CS11 seeks to safeguard the land covered by the 57/58 permissions for economic development. Draft Policy CS35 will supersede "saved" Local Plan policies E2 and E4 insofar as they apply to the study area. It is intended that Policy CS35 will however apply to the same area as that covered by "saved" Policy E2 (see plan below in paragraph 4.8.13).

3.8.8 Paragraph 4.26 of the draft Core Strategy notes that the continued development of the area will be primarily for warehousing and distribution uses.

3.8.9 Draft Policy CS5 seeks to realise the area's economic potential, subject to the resolution of the various environmental constraints.

3.8.10 Policy CS7 about Strategic Transport Infrastructure does not identify proposals for the delivery of a new junction on the M49 in the period to 2026, although paragraph 7.12 notes that:

The Council will also work to continue to identify funding and lobby central government and the Highways Agency to deliver a junction on the M49 to enable further employment development at Severnside and Avonmouth.

3.8.11 The development of a new M49 junction therefore continues to be a pre-requisite to further development in the study area beyond that which already benefits from extant planning permissions.

3.8.12 The study area is located within the Coastal Zone as defined on the Proposals Map. Draft Policy CS9 states that new development should "*avoid the undeveloped Coastal Zone*" and states that:

"such development that requires a coastal location will be directed to the developed areas of the Zone (these are the areas within the ….. Severnside employment area …..), subject to satisfying the requirements of the Exception Test as set out in PPS25, the legal provisions of the Habitats Regulations 1994 and meeting the conservation objectives of the Severn Estuary SPA/SAC/Ramsar."

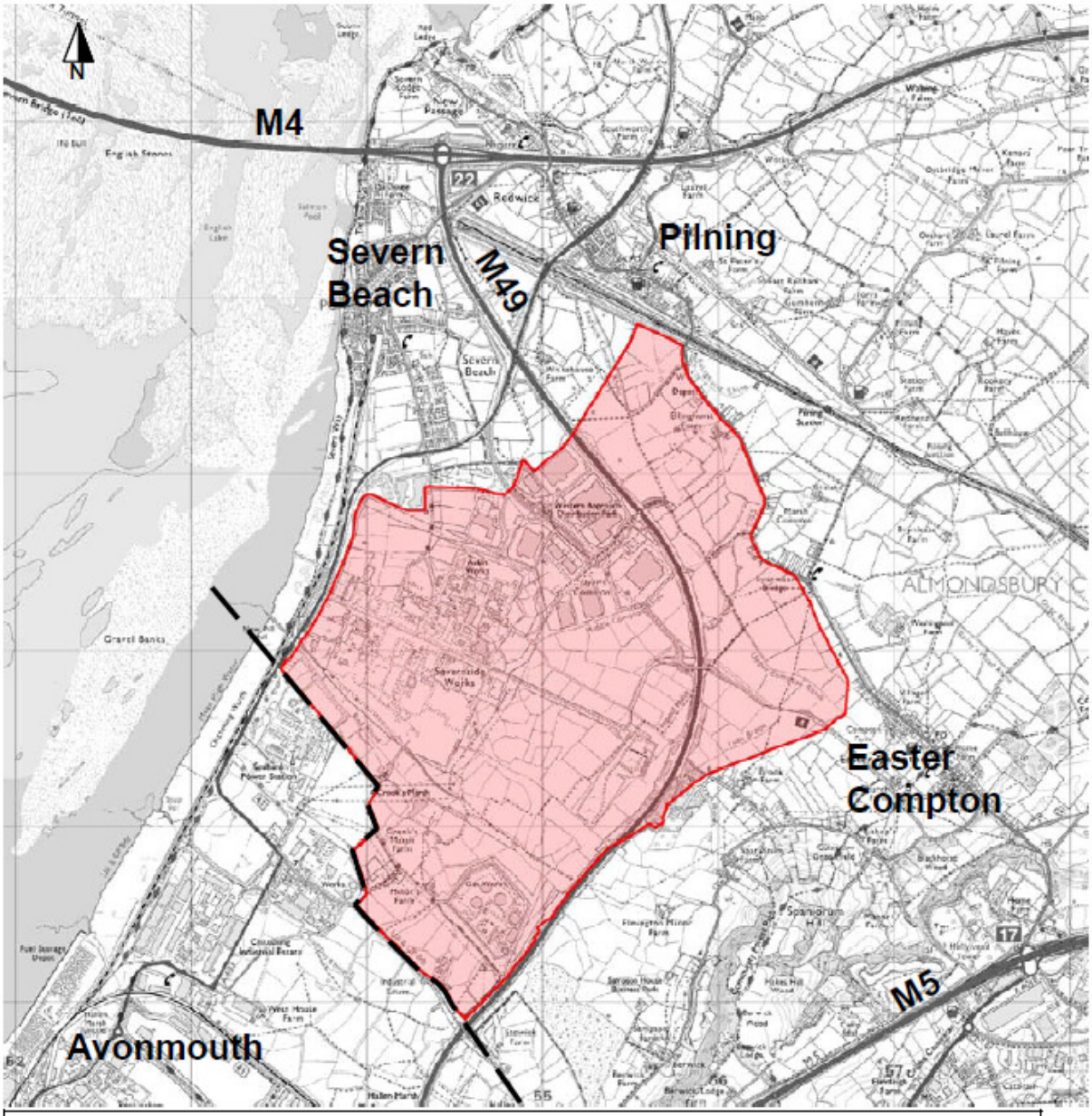
3.8.13 The separate draft Policy CS35 sets out the proposed approach to that part of the study area's development that falls within South Gloucestershire and acknowledges the Council's role in taking forward mitigation strategies for the area.

3.8.14 The draft policy sets out the Council's:

"*intention is to seek co-operation from all landowners through a strategic framework plan for the whole area that has been agreed with the Council, together with a planning performance or co-operation agreement.*"

3.8.15 The area covered by the draft policy reflects that covered by current "saved" Local Plan Policy E2. It therefore covers land beyond that covered by the 57/58 permissions and includes substantial areas of undeveloped green field land (see plan below).

Extract from South Gloucestershire Core Strategy



Proposed Change:

1. New Figure, showing the extent of the Severnside area.

3.8.16 However, the draft Policy states that:

Land at Severnside will be safeguarded and developed for distribution and other extensive employment uses broadly in line with the extant planning permissions dating from 1957 & and 1958.

and it therefore appears that the intention is that the land safeguarded for employment development is more specifically restricted to that covered by the 57/58 permissions, although the policy itself covers a much wider area.

3.8.17 The draft Core Strategy also notes that the review of the 57/58 permissions being undertaken by Cresswell Associates is underway in accordance with the requirements of the Habitat Regulations.

3.8.18 On transport matters, the Core Strategy also notes at paragraph 17.16 that:

The Highways Agency Avonmouth/Severnside traffic model predicts the traffic impact for development scenarios without a new M49 junction in place. This clearly demonstrates that the limited capacity of the existing local road network will be overwhelmed by traffic demand arising from new development and there will be traffic congestion both within the Avonmouth/Severnside area and on the road links leading up to it. This congestion will deter new businesses from setting up in the area, unless capacity is increased and access to major routes improved. There will also be adverse environmental impacts arising from the increase in traffic loadings.

3.8.19 The Council's desire is therefore to see the delivery of a new M49 junction as part of the area's development. The Core Strategy does however acknowledge that "*employee related trips are more likely to use the local road network*" and it therefore also supports a "*green travel*" approach to employee travel to and from the area and significant improvements to associated bus and rail links.

3.8.20 We have not, as part of our work, examined the earlier evidence in respect of transport modelling within the study area, but have relied upon the broad conclusions that have been brought forward from the adoption of the Structure Plan in 2002 to the emerging Core Strategy i.e. that there is a need for a new M49 junction and other transport improvements to relive the potential for congestion that could deter economic development in the area.

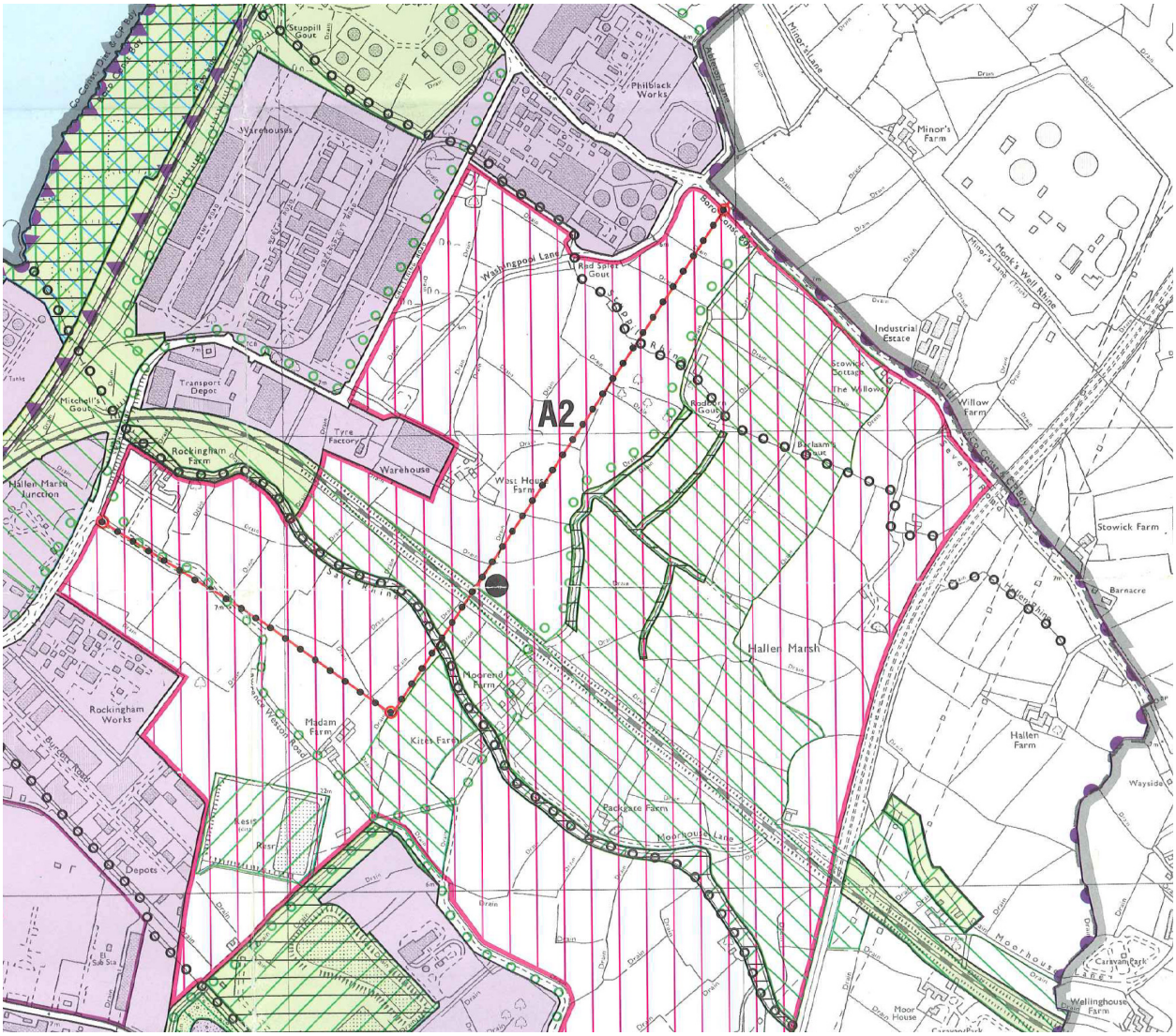
3.9 Bristol Local Plan

3.9.1 Most of the specific Local Plan policies that governed development proposals within the Avonmouth area have not been saved and have been superseded by Core Strategy Policy BCS4 (see section 3.10). The recently adopted Core Strategy for Bristol sets out a more restrictive approach to the development of the Avonmouth area than was envisaged in the Local Plan.

3.9.2 The Local Plan originally envisaged that a Key Regeneration Area be allocated for employment uses to the north of the existing railway line through the area. The allocated area (hatched red in the plan below) principally comprised green field land immediately to the north and south of the railway line through the Avonmouth area. Although much of the land to the south of the railway line has

been developed for warehousing and distribution uses over the last 15 years, the majority of the allocated land to the north remains in agricultural use.

Extract from Bristol Local Plan Proposals Map



3.9.3 This Council's revised approach in its adopted Core Strategy is taken in recognition of the challenges that need to be addressed within the study area, particularly in relation to the development of green field land.

M49 Junction

3.9.4 In a similar manner to the South Gloucestershire Local Plan, the Bristol Local Plan also identified a requirement for a realigned A403 and new M49 junction. The Plan envisaged that the A403 be diverted to run through the Key Regeneration Area to act as a spine road for that area's development and to link to a new M49 junction. At that time, the Plan also referred to the possibility of a new link between the A403 and junction 17 of the M5 within South Gloucestershire.

Extract from Bristol Local Plan

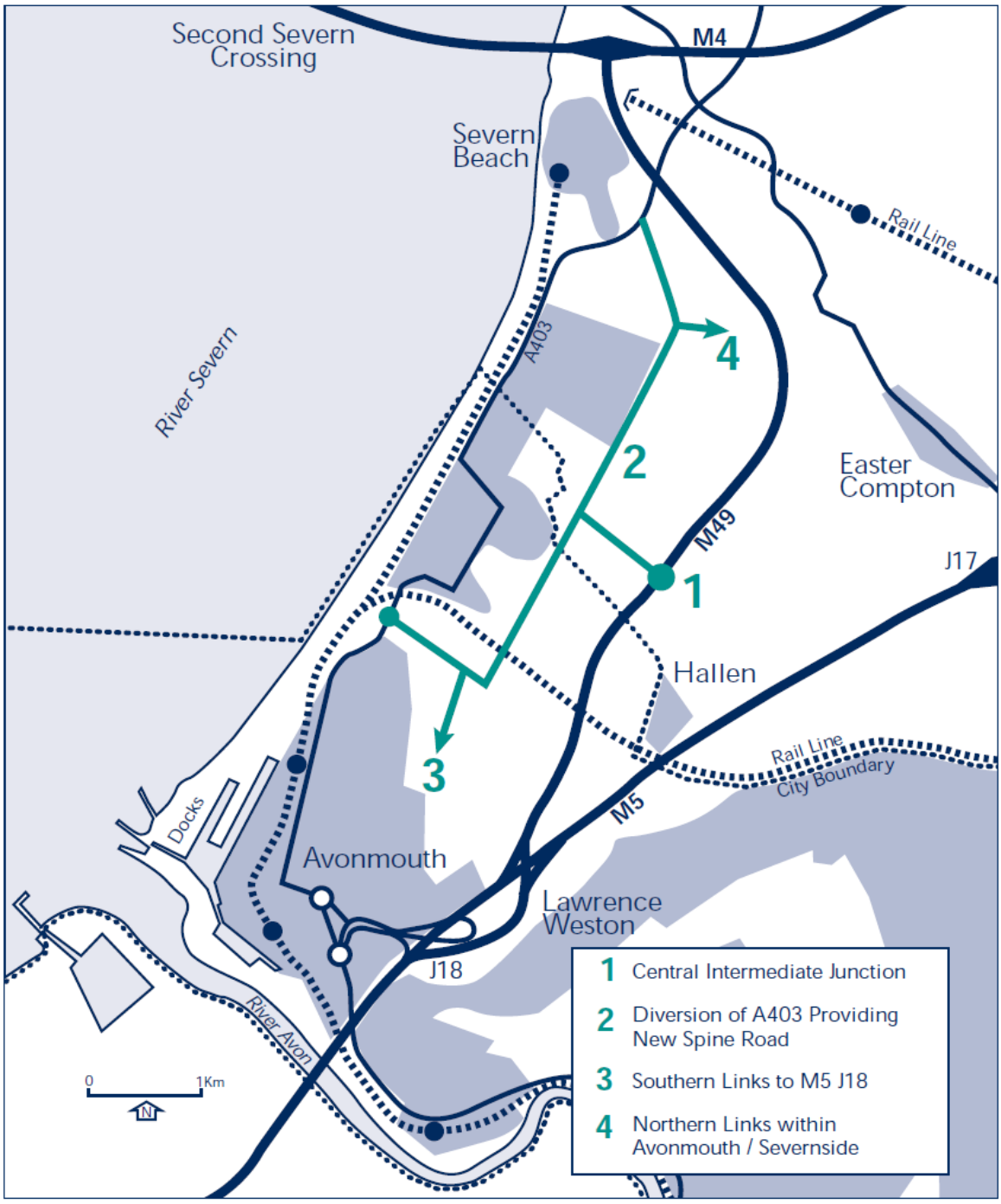


Figure 12.2: Illustrative road network and split junction.

3.9.5 The indicative plans in both the Bristol and South Gloucestershire Local Plan identified proposals for a new M49 junction in a central location within the study area, just to the north of the existing LNG plant (see sections 3.7.6 and 3.9.4 below).

3.10 Bristol Core Strategy

3.10.1 Bristol City Council adopted its Core Strategy in 2011 and the policies in it must be read alongside other development plan policies. The Strategy deletes land that was previously allocated for "regeneration" development in the Avonmouth area from the Local Plan Proposals Map. The Vision for the area's development is set out in paragraph 2.7.4 above. The broad approach is to balance support for the area's economic importance as the City's largest industrial area with the protection of its environmental assets.

3.10.2 Core Strategy policy BCS4 deals specifically with the Avonmouth area and seeks to particularly encourage "*proposals for port-related activities, manufacturing industry, logistics/distribution, waste management and other environmental technology related industries*". The policy also acknowledges that there may be opportunities for the development of "*energy from waste facilities, biomass energy and further large scale wind turbines*".

3.10.3 The supporting text to the policy in the adopted Strategy states that it "*does not promote new allocations for employment development on green field land.*" It also notes that development within the area should only comprise industrial and warehousing and sui generis uses of a similar nature.

3.10.4 Paragraph 4.6.16 in support of Policy BCS16 explicitly states that:

It is not proposed to designate green field sites for industrial and warehousing use where that land is at risk of flooding and does not already benefit from planning permission.

3.10.5 This approach is carried through to the Council's emerging Site Allocations DPD (see section 4.11 of this report).

3.10.6 The Core Strategy notes the need to work with other partners in the area and, in particular Natural England, the Environment Agency and neighbouring Council's (including South Gloucestershire Council) to "*explore potential habitat creation*" in the area. This commitment is being taken forward via the study commissioned from Cresswell Associates (see section 1.9 above).

3.11 Site Allocations Development Plan Documents (DPD)

3.11.1 Neither Council has published its Site Allocations DPD. However, Bristol City Council has consulted about preliminary proposals for the Avonmouth area in 2010 (see documents at: http://www.bristol.gov.uk/page/site-allocations-and-development-management-document).

3.11.2 Bristol City Council has indicated that its DPD will identify the Principal Industrial and Warehousing Areas (PIWA) as explained in the delivery section of Core Strategy Policy BCS8. The PIWA will include locations which have been developed for industry and warehousing since the Employment Land Study surveys were undertaken and any green field sites with unimplemented planning permissions.

3.11.3 The DPD will also identify important freight and passenger rail facilities and infrastructure in Avonmouth for safeguarding. The DPD is expected to reflect the Core Strategy's broad approach of not promoting employment development on green field land at Avonmouth.

3.12 Community Infrastructure Levy (CIL)

3.12.1 Bristol City Council has published a draft charging schedule for the CIL in November 2011. It anticipates a nil charge for economic development and it is therefore likely that such development in the Avonmouth/Severnside area will not be liable for CIL. Bristol City Council will however be able to consider whether to prioritise the spending of CIL collected from other development on the strategic infrastructure required for this study area.

3.13 Bristol Employment Land Review

3.13.1 The Council's Employment Land Review 2009 (http://www.bristol.gov.uk/page/land-use-development-and-planning-policy-research#jump-link-5) notes about the Avonmouth area that:

Alder King have commented that much of the land remaining in Avonmouth is being taken-up by a particular type of operation; namely, for large format distribution premises. They also highlight the role that it can play in supporting the operations of the Port of Bristol.

…

Furthermore, Alder King and other industrial property agents have reported that Avonmouth might not be suitable for all new industrial and warehousing development. This is because some industrial and warehousing operations require significant staff numbers to carry out their operations. Avonmouth has a limited local labour supply. As a consequence, there is a perception that many existing companies in Bristol would prefer the choice of sites in parts of the city ideally closer to their current location and its labour force.

…

During the consultation process the Bristol Industrial Agents Society (IAS) – of which Alder King is part – concurred with the City Council's view that there was a need to provide additional industrial and warehousing land to meet demand in the city. They also identified a developing need to provide more at Avonmouth, that was driven by the demands of an expanding and developing retail sector and changes in distribution patterns and practices. They noted that the growth of the Port of Bristol was likely to add to this demand.

3.13.2 The study concludes that:

Although it would be inappropriate to add to existing risks by allowing additional development in the Avonmouth industrial area, there would be unacceptable economic consequences if the process of renewal was to be prevented, undermining confidence in its future. Any loss of PIWA land here could not be replaced elsewhere within Bristol. In view of its vital employment role and the key infrastructure located in the Avonmouth area – motorways, rail links, port, power station, etc. – it is essential that regeneration of the existing developed area is sustained.

3.13.3 The existing Principal Industrial and Warehousing Areas (PIWA) of Avonmouth were reported as occupying approximately 620ha.

3.14 South Gloucestershire Employment Land Review

3.14.1 The Council's Employment Land Review Stage 3 June 2010 (http://www.southglos.gov.uk/NR/rdonlyres/0B4D8151-44CF-4783-B541-A19AE1B915B3/0/PTE100127.pdf) notes demand for accommodation for "*new technologies*" at Emersons Green and manufacturing and distribution facilities at Severnside. In particular, it notes that, at Severnside, there is active interest in developing the area – principally for Distribution uses. The Review also notes that waste management and energy related developments have difficulty in finding appropriate sites, apart from Severnside, and suggest that planning policies should plan to accommodate such uses in the area.

3.14.2 The Review concludes in relation to Severnside that, inter alia, the area is suited to:

"low intensity employment related uses including warehousing, recycling and energy generation. Waste Management and energy related developments have difficulty in finding appropriate sites, apart from at Severnside, so policy should allow for this in a controlled way."

3.14.3 The Review does however also note that the take up of land covered by the 57/58 permission will be "*largely driven by market forces.*"

3.15 South Gloucestershire Local Economic Assessment (LEA)

3.15.1 The LEA notes that:

The Severnside Strategic Employment area is located next to the River Severn to the west of the M49 and the urban area of Bristol. Due to planning permissions granted in 1957/58 covering approximately 650 hectares, the area has been recognised for some years as a potential major employment location. Regional and local planning policy continues to support its development, while recognising the significant constraints that affect the area by way of flood risk, highway infrastructure, ecology and archaeology.

3.16 Conclusions

3.16.1 Each Council's Local Plan policies have been broadly supportive of further economic development within the study area, subject to proposals addressing the identified constraints. The adopted Bristol Core Strategy and emerging South Gloucestershire Strategy both acknowledge, to a greater extent than earlier policies, the environmental constraints to further development in the study area.

3.16.2 This study does however look beyond the Core Strategy period of 2026 to 2050 and the opportunities for further development within that period. It therefore seeks to identify opportunities to address the constraints identified in current and emerging development plan documents.

3.16.3 The desire to see the study area reach its full potential and bring forward significant areas of additional green field land for development before 2026 within the Bristol area may need to be tested through the Site Allocations and Development Management DPD in respect of the Avonmouth area and review of the Core Strategy, or by way of planning application..

4.0 Control of Major Accident Hazards (COMAH)

4.1 Context

4.1.1 Sites that use and store large quantities of hazardous substances pose risks to the surrounding population. These risks are regulated and managed in a number of ways, mainly through compliance with the COMAH Regulations, but also by controls on land use planning.

4.1.2 COMAH regulations and related guidance aim to prevent major accidents involving dangerous substances and to limit the consequences to people and the environment of any that do occur. Local planning authorities are required to consult HSE on certain proposed developments in the vicinity of major hazard establishments and to take into account advice from HSE when making planning decisions.

4.1.3 The study area includes a number of industrial and infrastructure installations that use and/or store large quantities of hazardous substances. The use of these is regulated under the Control of Major Accident Hazards Regulations 1999 and the Amendment Regulations 2005, commonly referred to as COMAH.

4.1.4 Each installation within the study area is shown on the plan at Appendix 11. The plan and other plans at Appendix 11 also show the HSE designated consultation areas around these installations. Within these consultation zones, the Councils should consult the HSE about development proposals that are likely to lead to an increase in population within those areas.

4.1.5 When the HSE is consulted about such development, it will either advise against the proposed development or note that it does not advise against it. The HSE's role in the land use planning system is advisory. It has no power to refuse consent or a planning application. It is the responsibility of the HSE or LPA to make the decision, weighing local needs and benefits and other planning considerations alongside HSE advice.

4.1.6 Councils may be minded to grant permission (or allocate land for development) against HSE advice. The HSE will not pursue the matter further as long as it is satisfied that the Council understands and has considered the reasons for their advice. However they do have an option, if they believe for example that the risks are sufficiently high, to request that decisions are 'called in' for consideration by the Secretary of State.

4.1.7 The HSE responds to consultations about new development proposals using its recently developed PADHI (Planning Advice for Developments near Hazardous Installations) methodology:

http://www.hse.gov.uk/landuseplanning/padhi.pdf

4.1.8 The HSE guidance is based on the consultation zone in which development is proposed and the "sensitivity" of that development. The HSE "*Advises Against Development*" of "*workplaces (predominantly non-retail) providing for 100 or more occupants in any building*" in Inner Consultation Zones.

4.2 Implications for the Study Area

4.2.1 Although some small scale employment development on green field land and the development of previously developed has been permitted within the Inner Consultation Zones of hazardous installations within the study area, for the purposes of this study, we have assumed that additional employment development should normally be avoided within such Zones.

4.2.2 However, the restriction on employment development within the HSE Inner Consultation Zones does not apply to the development of the 57/58 permission because that permission was granted prior to the introduction of the HSE guidance. The presence of these Zones may however affect investment within the areas covered by them in the future, but that does not appear to be the case at present.

4.2.3 The situation in relation to previously developed land is less straightforward. Each site is different, but the general approach of the HSE will be to advise against development that could increase the risks within such areas i.e. that could result in significant numbers of additional people being employed within such areas.

4.2.4 However, for the purposes of this study, we have assumed that, even if the HSE were to advise against the development of previously developed land within the designated Inner Consultation Zones, other material planning considerations are likely to weigh in favour of such development. We have therefore assumed that hazardous installations would not unduly restrict the redevelopment of previously developed land for employment purposes. This assumption would need to be reviewed in more site and hazardous installation specific detail in consultation with the HSE.

4.2.5 It should also be noted that it *may* be possible to develop some low employment generating uses within the Inner Consultation Zones around hazardous installations (for example, open storage uses). This approach could enable the redevelopment of existing sites in use for low employment generating uses, such as open storage, for more intensive employment uses. For example, the Co-op is developing its new 40,000 square metre distribution warehouse on land previously used by Honda for open storage purposes in the Avonmouth area.

4.3 Transport Infrastructure

4.3.1 The indicative location of the new M49 junction that is shown in both Councils' Local Plans is within an HSE Inner Consultation Zone. The HSE would normally object to the development of new motorway infrastructure within such Zones. Proposals for the new M49 junction will need to be the subject of consultation with the HSE, but it is likely that they would advise against such a development. It is therefore likely that a new M49 junction would need to be located outside the HSE's Inner Consultation Zones (for example, in the location illustrated in the s106 agreement attached to the WAP 1 permission (see section 2.4.2)).

4.4 National Grid's Liquified Natural Gas (LNG) Storage Facility at Avonmouth

4.4.1 National Grid's LNG facility at Avonmouth is located between the developed Severnside and Avonmouth areas in proximity to the M49 to the east (see H0584 on the plan at Appendix11). It is one of three such facilities in the UK. It has the largest HSE designated Inner Consultation Zone within the study area and, because of its location, would restrict employment development of some

of the green field land within central part of the study area. We have therefore investigated the likelihood of this facility closing during the period to 2050.

4.4.2 Although we have not consulted the operator of the facility about its intentions, the OFGEM report at:

http://www.ofgem.gov.uk/NETWORKS/TRANS/GASTRANSPOLICY/LNGPRICECONTROL/Documents1/LNGPC%202010%20Initial%20Proposals.pdf

states that:

Avonmouth is the newest of the three sites, and its facilities are in comparatively good condition. NG LNG consider that it has a viable future supplying both commercial and regulated services, and have submitted plans for refurbishment to prolong the site to beyond 2020.

4.4.3 The report also indicates that National Grid's planned capital investment in the facility in 2011/12 and 12/13 would be £6.0 million and £5.9 million respectively.

4.4.4 We have therefore assumed that the LNG facility within the study area will remain for the foreseeable future.

4.5 Risks

4.5.1 The risks for this study that are associated with hazardous installations include:

Risks	**Mitigation**
The extent of hazardous installations, their associated consultation zones and the guidance about development within those zones could change during the period to 2050.	Monitor changes in the COMAH zones in consultation with the HSE. The impact of these changes could be both positive (in terms of enabling additional land to be considered for development), or negative (by reducing the extent of land available for additional employment development).
The redevelopment of previously developed land within the HSE designated Inner Consultation Zones is restricted.	Consultation will be required with the HSE about the redevelopment potential of previously developed land within Inner Consultation Zones, particularly where the use of such land has ceased and buildings have been demolished.

4.6 Conclusions

4.6.1 New, major employment development is unlikely to be acceptable within the inner consultation zones around hazardous installations shown on the plan at Appendix 11. The allocation of additional land for employment development within the study area will therefore need to be restricted to areas outside these zones.

4.6.2 We have assumed that the development of the 57/58 permission will continue within the designated inner consultation zones and that the redevelopment of previously developed land may also continue within these zones.

4.6.3 It is likely that the development of a new M49 junction will need to be located outside the designated inner consultation zones.

5.0 Statutory Undertakers Services

5.1 Context

5.1.1 As part of our work, we have not:

- undertaken detailed searches of statutory undertakers services;
- investigated the capacity of such services to accommodate additional development in the area; or
- identified abnormal costs for providing any additional statutory undertakers infrastructure that might be required to serve any additional development within the study area.

5.1.2 This study therefore assumes that developers will not need to meet any abnormal costs to divert or enhance such services to serve new development.

5.1.3 Our work has however taken account of the presence of the existing above ground statutory undertakers' services and infrastructure within the study area that includes a sewage works and overhead power lines. It has also considered the implications of the underground oil and gas pipelines within the study area.

5.1.4 The presence of over and underground mains services will limit the development potential of some parts of the study area as development will be restricted over and in proximity to such assets.

5.2 Overhead Power Lines

5.2.1 Overhead power lines are shown on the OS base plans for the study area. The area is crossed by a number of overhead power lines, particularly those linked to the Seabank Power Station that cross the central part of the study area in an east/west direction. Development of buildings will not be possible within the corridors occupied by the overhead power lines. However, it is likely that such areas could be developed with ancillary facilities such as car parking.

5.3 Pipelines

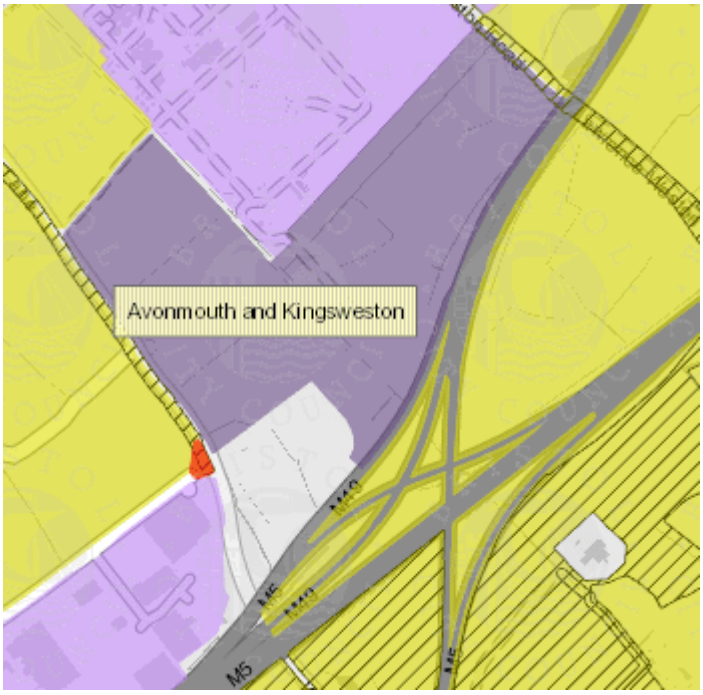
5.3.1 We have undertaken searches to identify the location of major underground oil and gas pipelines within the study area via the government's pipeline agency at http://www.linesearch.org/

5.3.2 The searches have revealed the presence of a number of major pipelines that cross the study area and these are shown in the plans at Appendix 12. Development of buildings will not be possible within the corridors occupied by such pipelines. However, we have assumed that such areas could be developed with ancillary facilities such as car parking.

5.4 Wessex Water Proposals

5.4.1 Current development plan policies identify the need to expand the existing sewage works within the Avonmouth area and the Bristol Local Plan Proposals Map identifies an area adjacent to the existing works for this:

5.4.2 The area is also shown in the Council's Site Allocations and Development Management Options consultation documents from October 2010 (although issues relating to flood risk and wildlife habitat will need to be resolved before any allocation can be confirmed):



5.4.3 We have assumed that the development of this infrastructure will be funded by Wessex Water and that it will not therefore need to be funded by development within the study area.

5.4.4 Wessex Water also has proposals (that are the subject of a current planning application) to develop 4 no. 130 metre high wind turbines, each capable of generating 3MW of electricity within its Avonmouth site:

Wind turbine location plan

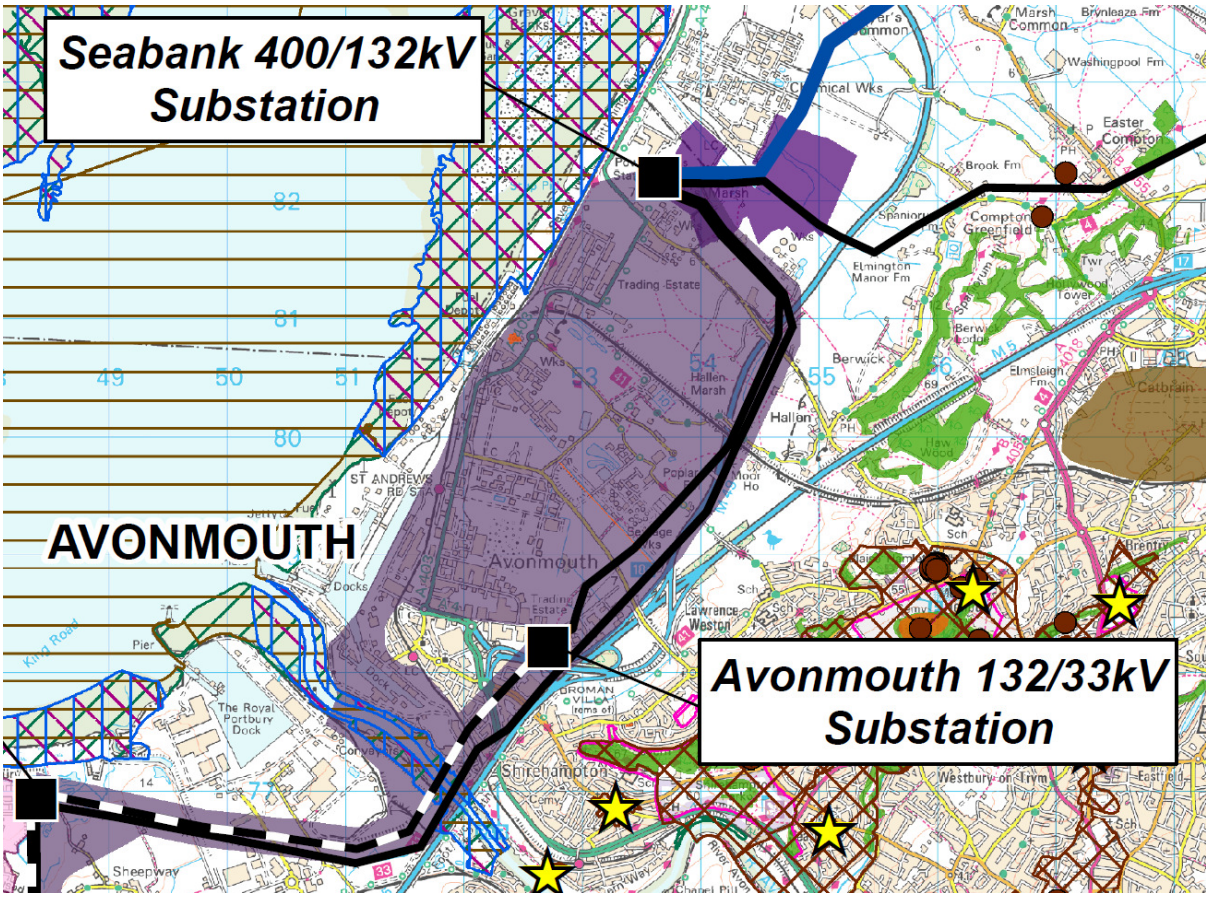
Proposed sites of the four turbines

5.5 National Grid Proposals

5.5.1 National Grid has consulted on proposals to provide overhead power lines to link the Hinkley Point (to the south west of the study area) and Seabank (centrally located within the study area) power stations (see information at: http://www.nationalgrid.com/uk/Electricity/MajorProjects/HinkleyConnection/ and http://www.hinkleyconnection.co.uk/).

5.5.2 National Grid's consultation sets out options for route corridors that affect a substantial part of the study area (the extent of the study area is shown on the plan at Appendix 13). A precise route has yet to be proposed by National Grid or agreed by the Infrastructure Planning Commission. The development of new buildings will not be possible along the corridor occupied by the proposed overhead power lines. However, we have assumed that the route could be developed with ancillary facilities such as car parking.

5.5.3 National Grid did however announce its Preferred Route Corridor on the 30th September 2011 and an extract showing the study area is included below:



5.6 Risks

5.6.1 The risks for this study that are associated with statutory undertakers services include:

Risk	Mitigation
Existing services require substantial easements that restrict development.	Review detailed location of services within areas intended for further development. Examine feasibility (including cost) of diverting existing services where this is necessary.
Existing services are inadequate to serve new development.	Investigate capacity of services to accommodate additional new development and cost of upgrading those services.

5.7 Conclusions

5.7.1 The presence of existing and planned over and underground services will to some extent limit the development of land within the study area.

5.7.2 We have assumed that:

- it would not be feasible to divert the existing overhead power lines or underground gas and oil pipelines to accommodate economic development within the study area and that new development must take account of these;
- the presence of existing statutory undertakers services would not unduly restrict economic development within the study area;
- it would not be possible to allocate other land for the expansion of Wessex Water's sewage works, or to develop the allocated land for other purposes; and
- ancillary facilities (such as car parking) could be developed over (in the case of underground pipelines) or under (in the case of overhead power lines) statutory undertakers' services.

5.7.3 Further detailed work will need to be undertaken to assess the capacity of statutory undertakers' services to accommodate the planned development within the study area and any abnormal costs associated with the enhancement of the existing capacity. However, for the purposes of this study, we have assumed that there would not be any abnormal costs to enhance the capacity of existing statutory undertakers' services.

6.0 Contamination

6.1 Context

6.1.1 The area has been occupied by a variety of industries, including chemical plants, waste processing facilities and power generating plant. It is likely that many of the previously developed sites within the study area suffer from a degree of contamination. There is also a risk that some of the green field land within the study area has been contaminated by past industrial activity in the area. The extent of contamination is likely to vary from site to site, depending on the past uses.

6.1.2 A brief examination of a sample of desk top and site investigation contaminated land studies submitted with planning applications for proposals on previously developed land within the study area indicate that the nature of contamination varies significantly from site to site.

6.2 Implications for the Study Area

6.2.1 It is very likely that much of the previously developed land within the study area has been contaminated from previous industrial and other uses. It is also possible that green field sites within the study area have been contaminated from activity on other land in the area. However, it is important to bring forward the development of previously developed land because new development can act as a catalyst for dealing with contamination and to avoid dereliction in the area.

6.3 Costs

6.3.1 The financial costs of mitigating contaminated land will depend on many factors including the nature of the contamination and the proposed end use of the site.

6.3.2 English Partnerships published guidance in Best Practice Note 27 (revised February 2008) Contamination and Dereliction Remediation Costs at:

http://collections.europarchive.org/tna/20100911035042/http://englishpartnerships.co.uk/landsupplypublications.htm

6.3.3 However, it notes that estimating the cost of remediating previously developed land for re-use is a "*complex exercise and one that is fraught with uncertainties*".

6.3.4 Although the guidance includes a range of costs for remediating contaminated/derelict land, that range is significant and depends on many factors including the complexity of the site. Bearing in mind the variety of different uses that have taken place within the study area, it is not possible to include a reliable average cost per hectare for remediating contaminated or derelict sites. The cost of remediating previously developed land should instead be included within the study as a significant risk.

6.4 Risks

6.4.1 The risks for this study that are associated with contamination include:

Risk	Mitigation
Cost of dealing with contamination is very high.	Undertake a review of contaminated land within the study area and investigate costs of mitigating known contamination.
Cost of dealing with contamination renders redevelopment for employment uses unviable.	Investigate options for securing funding to remediate the land.
Contamination limits the ability to develop some land.	Undertake a review of contaminated land within the study area and investigate costs of mitigating known contamination.
Green field land is contaminated.	Undertake a review of contaminated land within the study area and investigate costs of mitigating known contamination.

6.5 Conclusions

6.5.1 It would not be appropriate to avoid development on previously developed or green field land that is the subject of contamination. The development of such land provides an important opportunity to ensure its remediation. We have therefore assumed that such land is suitable for development within the study area.

6.5.2 However, we have not incorporated land remediation costs in this study. The potential costs of remediating land could be significant, particularly on previously developed land, but the costs will be site specific.

6.5.3 Further investigation of land contamination will be required on a site by site basis as part of the development management process and more detailed feasibility work that will be required to investigate the costs of implementing the infrastructure and mitigation measures in this study.

7.0 Green Infrastructure (GI)

7.1 Context

7.1.1 The project brief requires that the need for GI provision should be taken into account with particular reference to Bristol's Core Strategy. GI is defined in a number of different ways. South Gloucestershire Council's definition is:

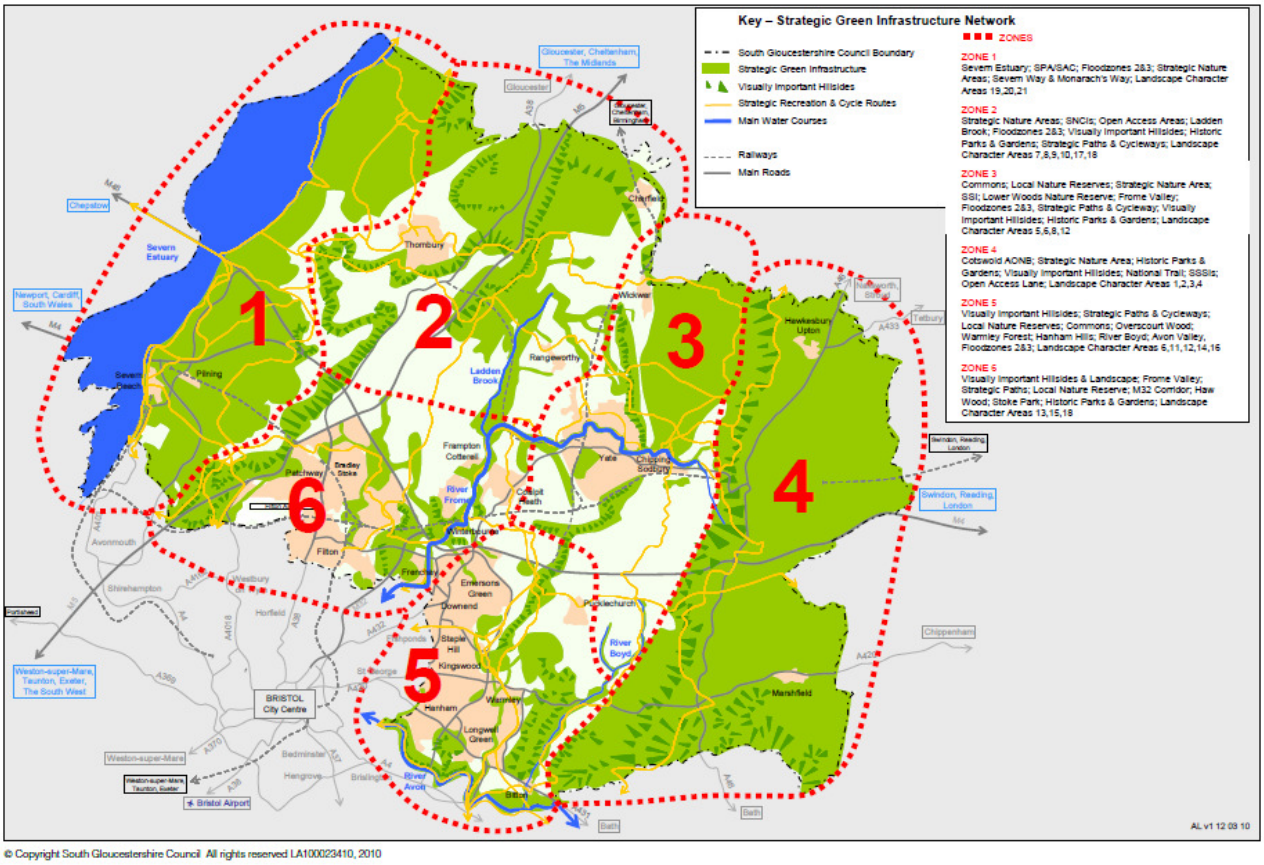
a multi-functional network of high quality green space and linkages which operate at a variety of spatial scales. GI assets contribute to people's well-being, and together comprise a coherent managed resource responsive to evolving conditions.

and Bristol City Council's definition is:

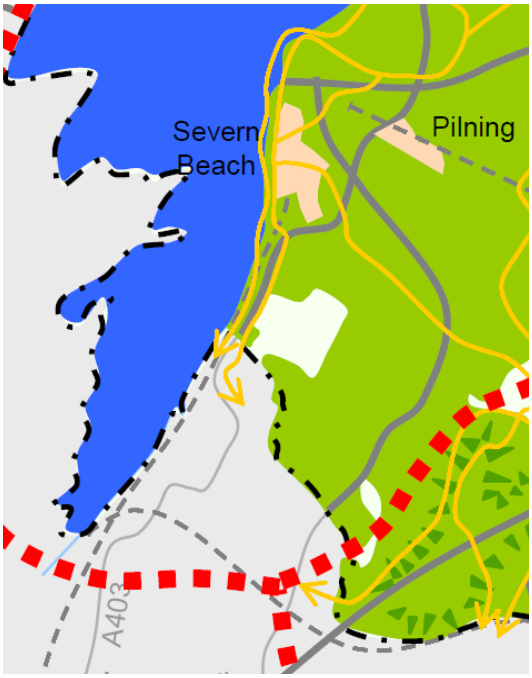
the term used to describe the network of green assets that can work together to support sustainability and quality of life within and around Bristol.

7.1.2 Both Bristol and South Gloucestershire's Core Strategies promote the provision of GI within the study area.

7.1.3 South Gloucestershire Council's Core Strategy shows much of the Severnside area as being Strategic GI, notwithstanding other Core Strategy policies that identify the land for employment development. The following extract from the Core Strategy shows GI throughout the Council's area, including the study area:

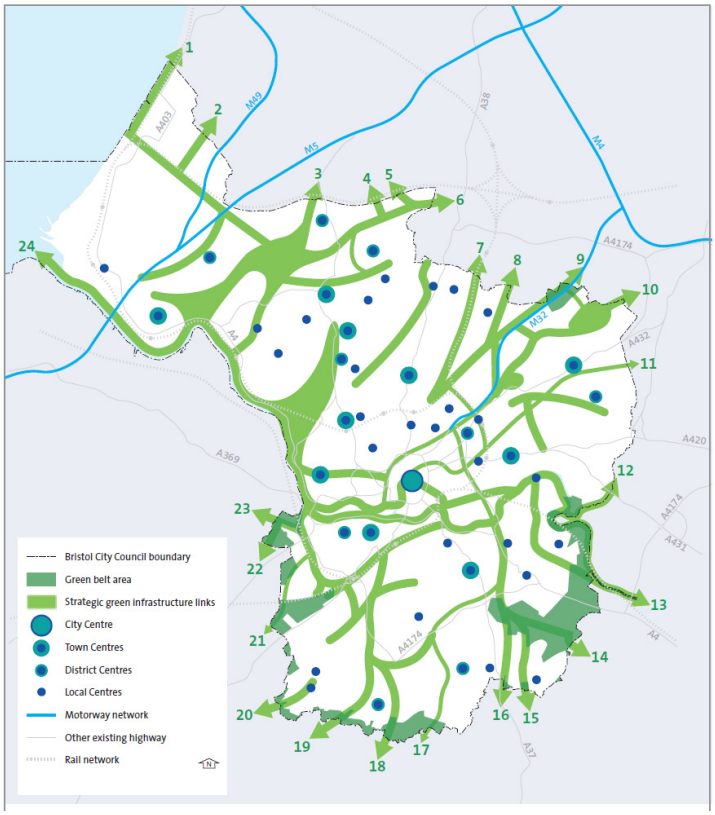


7.1.4 The more detailed extract below shows the proposed "*strategic recreation and cycle routes*" through the study area that would link with the GI corridors in the Bristol Core Strategy:



7.1.5 Bristol's Core Strategy shows indicative areas within the Avonmouth area on the following plan:

Diagram 4.9.1: Strategic Green Infrastructure Network



7.2 Implications for the Study Area

7.2.1 Development within the study area will need to make provision for GI in accordance with the Core Strategies. However, the precise nature and extent of the GI will need to be established through each Council's Site Allocations DPD.

7.2.2 It is recommended that the GI corridors should be at least 25m wide and 500m long and should incorporate the retention of existing landscape and habitat features, such as rhynes and hedges.

7.2.3 The broad approach that we have assumed in this study is that GI corridors of at least 25m wide will be required in both a north/south and east/west direction through the study area. These corridors could take a number of different forms, but should seek to follow existing GI features.

7.2.4 The indicative plans in each Council's Core Strategy indicate that green corridors are likely to be required alongside the existing railway line and along the coastal fringe of the study area. A corridor will also need to be reserved through the central part of the study area running between the coastline and M49.

7.2.5 In the context of the developed nature of the Avonmouth area south of the railway line and the 57/58 permissions in the north of the study area, the provision of GI will principally be restricted to the coastal zone in these parts of the study area.

7.3 Costs

7.3.1 The need to provide GI (and the corridors linking the Avonmouth and Severnside areas):

- could be combined with other mitigation requirements including ecological mitigation, COMAH zones etc; and
- supports our assumption about the density of any new development within the study area (see section 14.0 below).

7.3.2 We have not therefore incorporated a separate infrastructure cost within this study to provide GI, but have assumed that it will be provided through the normal development management process and as part of the requirement to mitigate the impact of development on the area's ecology.

7.4 Phasing

7.4.1 The development of new, or retention of existing green infrastructure is likely to come forward on a phased basis in parallel with individual developments and the ecological mitigation outlined in section 10.0.

7.5 Risks

7.5.1 The risks for this study that are associated with GI include:

Risks	**Mitigation**
GI requirements are not co-ordinated with the requirement to provide ecological mitigation/COMAH zones etc.	Ensure that GI provision is linked to other mitigation requirements to minimise the requirement for additional GI

7.6 Conclusions

7.6.1 The further development of the study area will need to be co-ordinated to retain existing and provide new and enhanced GI in accordance with emerging development plan policies. The provision of GI will need to be incorporated within each Council's Site Allocations DPD. Its provision will however need to be closely linked to the requirements to mitigate the impact of development on the area's ecology and any requirements to retain undeveloped corridors within the study area for services, COMAH zones etc.

7.6.2 Where planning permission is required for development within the study area, GI can be required within specific development proposals. It may also be possible to secure funding for the provision and future maintenance of GI through planning conditions and s106 agreements for individual developments.

7.6.3 Finally, some GI will be provided as mitigation for the ecological impacts of the development identified in section 10.0.

8.0 Landscape

8.1 Context

8.1.1 The study area is not the subject of any local, regional or national landscape designations.

8.1.2 It is however within Natural England's Severn and Vales Character Area 106 (http://www.naturalengland.org.uk/Images/jca106_tcm6-5557.pdf). The description of the area notes that it includes a diverse range of flat and gently undulating landscapes, united by broad river valley character. It also notes that in the vicinity of the study area, the industrial complexes of Avonmouth and the riverside power stations dominate the landscape.

8.1.3 South Gloucestershire Council published a Landscape Character Assessment SPD of its area in 2005 (http://hosted.southglos.gov.uk/landscapecharacterassessment/main%20doc-internetR1.pdf). It describes the northern part of the study area (Landscape Character Area 21 – Severn Shoreline and Estuary) as having an "*open and exposed simple landscape …*" dominated and influenced by the physical and visual presence of the estuary. It notes how the flood defences in the area form a "*wall*" between the unenclosed estuary landscape to the west and (in part) the enclosed agricultural fields to the east within the central part of the study area. The defences act as a prominent and defining feature and it is noted that defences have been a feature of this part of the estuary for some time.

8.1.4 The SPD also notes the prominence of large scale industry within the area and comments that "*potential substantial future development*" would result in "*significant further visual intrusion to the shoreline and Estuary further eroding the rural character and perception of remoteness within the area.*"

8.1.5 Cresswell's study (see section 12.0) notes that across much of the green field part of the study area, many of the fields contain a ridge and furrow landform.

8.2 Implications for the Study Area

8.2.1 Further development on green field land within the study area is likely to have a significant impact on the area's landscape. In particular, within the central part of the study area that is dominated by enclosed fields, further substantial development will have a negative impact on this landscape. Although new planting would be possible in conjunction with new development, it is unlikely to mitigate the large scale of modern industrial and warehouse development.

8.2.2 The redevelopment of previously developed land in the north and south of the study area is, depending on its height, mass and bulk, likely to have less of a landscape impact than the development within the central part.

8.2.3 In particular, development within the Avonmouth area to the south of the freight railway line is likely to have the least impact since much of this area is already developed with large scale industrial and storage and distribution buildings and the Port and its associated uses.

8.2.4 Further development along the coast will be prominent from views within and across the estuary and, again, development adjacent to the coast within the central part of the area is likely to have the most significant negative effects.

8.2.5 The opportunity to develop a flood defence along the western boundary of the site will have an impact on the landscape of the study area, but this impact will depend on the height and design of any such structure.

8.3 Costs

8.3.1 Mitigation for the landscape impact of new development will be required on green field and previously developed sites within and around development. However, the cost of such landscaping will be part of the "normal" cost borne by developers of individual sites.

8.3.2 The density of development that we have anticipated on land allocated for development takes account of the need to incorporate landscaping to mitigate the impact of that development.

8.4 Risks

8.4.1 The risks for this study that are associated with landscape impact include:

Risks	**Mitigation**
Landscape impacts of development, particularly on green field land are unacceptable and can not be mitigated.	Review whether other benefits of development outweigh the perceived landscape harm.

8.5 Conclusions

8.5.1 Although the area is not the subject of any specific landscape designations, its development with further industrial and warehouse development will inevitably have a significant impact on its landscape.

8.5.2 The landscape impact of new development is likely to be greatest on green field sites. In particular, the provision of large scale industrial, warehouse and distribution and sui generis uses on green field sites within the central part of the study area will have a significant impact on the landscape.

8.5.3 In the context of the above and the Councils' Vision in the Project Brief, proposals for new development within the study area will need to incorporate measures to, where possible, retain existing landscape features and provide new landscaping to mitigate their impacts. In particular, development of green field sites should seek to retain and enhance existing hedges and water courses. However, in seeking to ensure that the area fulfils its economic development potential, the Councils will need to acknowledge that it will not be possible to fully mitigate the landscape impacts of further development in the area.

9.0 Archaeology/Heritage

9.1 Context

9.1.1 The Severn Levels, including the study area, is an area of high archaeological potential because of the level of preservation of archaeological and palaeo-environmental remains surviving within the waterlogged silt deposits and peat layers. The Workshop and Bristol and South Gloucestershire Council's Local Plans and Core Strategies highlight the area's archaeological potential.

9.1.2 Development within the study area could result in the destruction of archaeological remains and could also indirectly affect water levels on adjacent land which could in turn affect the survival of waterlogged deposits.

9.1.3 The area's landscape is, within the central part of the study area, also of historic significance. The central part of the study area remains in agricultural use and comprises historic field boundaries, drainage channels and important hedgerows as well as the increasingly rare survival of ridge and furrow earthwork remains of medieval cultivation.

9.1.4 Development plan policies to protect heritage assets, including archaeology, are set out in each Council's Local Plan and Core Strategy and PPS5 – Planning for the Historic Environment. In particular, both Councils' Core Strategies seek to protect and conserve the area's archaeological heritage and interest. PPS5 requires that where development affects heritage assets, designated or not, an assessment of the significance of these assets is undertaken and appropriate mitigation included in support of applications for development.

9.1.5 The plan at Appendix 14 identifies the designated heritage assets and the location of Sites and Monuments records within the study area.

9.1.6 The study area only contains two designated heritage assets – two scheduled monuments:

- SM28885 WW2 Anti-Aircraft Battery near Rockingham Farm; and
- SM27988 Mere Bank sea defences and flanking ditches;

both within the Avonmouth area. However, the study area is potentially of much greater archaeological significance than is suggested by the limited number of designated heritage assets.

9.1.7 The recently published English Heritage sponsored Rapid Coastal Zone Assessment covering the English shoreline of the Severn estuary is the most recent study to have demonstrated the wealth of archaeology occurring within the area. Section 6.7 of the Phase 1 Report (see: http://www.english-heritage.org.uk/content/publications/docs/Severn_RCZAS_Phase_1_2009.pdf) makes particular reference to the study area's archaeology.

9.1.8 The area is a flood plain at the confluence of two rivers and has a long history of human settlement. Bristol City Council's SPD 7 – Archaeology and Development (2006) notes that:

The wetlands of the Severn Estuary have produced evidence for man's utilisation of this landscape from at least the late Bronze Age at Avonmouth …

9.1.9 South Gloucestershire Council has published SPG about archaeology in the Severnside area that highlights the potential importance of the area's archaeology that is available at:

http://www.southglos.gov.uk/NR/rdonlyres/AF46D9F0-71C5-440D-8B51-407B90D473C6/0/PTE070417.pdf

9.1.10 The nature of the sub soil means that archaeological remains within the area are well preserved and evidence has been found of neolithic, iron age, Roman, Saxon and Medieval settlements. Furthermore, parts of the visible landscape and drainage system within the central, undeveloped part of the site are of medieval origin and therefore of significant historic interest. There is therefore a high probability that green field land within the study area contains a variety of archaeological deposits.

9.1.11 Previously developed land within the study area may also contain a variety of archaeological deposits, although it is likely that earlier development on such areas will have disturbed those deposits.

9.1.12 Broad analysis of the area's archaeology is contained within the numerous reports (including environmental statements) that have accompanied planning applications within the study area. Reference has been made to a number of these in completing this study.

9.2 Implications for the Study Area

9.2.1 The report notes that the "Hold the Line" policy on flood risk will mean that existing flood defences in the area will be maintained for the long-term although there may be some erosion of the coastal salt marsh. The existing flood defences are expected to fail, but they will be reconstructed and enhanced.

9.2.2 This approach means that potential changes in the area caused by increased flooding, erosion, 'coastal squeeze' and/or the construction of new flood defences could impact upon prehistoric peat and alluvium deposits, prehistoric occupation deposits, areas of ridge and furrow, post-medieval land drainage and phases of river bank defences, and Second World war features. There will therefore need to be an archaeological assessment of the impact of intertidal and foreshore erosion and 'coastal squeeze' as part of any future flood risk management plans.

9.2.3 Although further development within the study area is unlikely to have a significant and direct impact on the small number of designated heritage assets, the study area does include a rich archaeological landscape.

9.2.4 Development of currently undeveloped areas may have a harmful impact on archaeology. Although the development of the 57/58 permission is able to continue without the need for mitigating its impact on the area's archaeology, elsewhere within the study area, developers will be expected to follow current good practice and assess the significance of archaeological remains affected by development and provide appropriate mitigation.

9.2.5 Further investigation will be required of the parts of the study area where further development is proposed. The further investigation is likely to include field evaluation, particularly on green field land, on a site by site basis.

9.2.6 Where development is desirable on green field land to help realise the area's economic development potential, site investigation will be necessary prior to development commencing. If archaeological or palaeo-environmental deposits are found during site investigation, an assessment will need to be made as to whether the foundations and groundworks for development within the area need to be adjusted to take account of important archaeology.

9.2.7 Where detailed investigations reveal significant potential for important archaeological remains, a programme of excavation and recording, followed by analysis, report preparation and publication, may also be required as mitigation.

9.2.8 If further investigation reveals archaeology of national importance, it may be necessary to preserve that archaeology in situ.

9.3 Costs

9.3.1 The cost of undertaking archaeological field evaluation is likely to be taken into account by developers in their purchase of land and buildings for development within the study area. The costs are unlikely to be high, but could be in the region of £10-25k per hectare where there is a requirement for field evaluation. Costs could of course be substantially higher in the event that archaeology is identified that requires mitigation.

9.3.2 Within the area covered by the 57/58 permissions, there is no requirement on developers to investigate the site's archaeology and therefore no associated costs (although the Council would expect developers to follow current archaeological good practice and provide archaeological mitigation).

9.4 Risks

9.4.1 The risks for this study that are associated with its archaeological importance include:

Risks	**Mitigation**
Important archaeology is present that requires preservation "in situ" rather than by recording and this restricts the area available for development.	Field evaluation of individual sites will be required as they come forward for development, The risk will be highest on green field land.

9.5 Conclusions

9.5.1 There are relatively few statutorily designated heritage assets within the study area. The impact of further development on these could often be mitigated at a local level, although in some circumstances the impacts of development on their settings could be from a wide area.

9.5.2 However, the impact of further development in the area on its undesignated heritage assets, including the historic landscape of the area and below ground archaeology, could be significant in the absence of appropriate mitigation.

9.5.3 Mitigation in the study area is likely to comprise desk top study, field evaluation and preservation of archaeological remains by record, rather than by preservation "in situ".

9.5.4 Where further evaluation reveals archaeology of national importance, it is likely that preservation will be required in situ. However, the likelihood of archaeology of such importance being present within the study area is relatively low on the basis of investigations that have taken place to date in connection with planning applications within the study area.

9.5.5 The Councils will need to consider the weight to be attached the area's undesignated heritage assets, particularly the area's archaeology, in the context of the desire to see the area fulfil its

economic development potential. However, for the purposes of this study, we have assumed that the preservation of the area's archaeology will, where disturbance is required to accommodate development, principally be by record rather than in situ.

10.0 Ecology

10.1 Context

International and National Designations

10.1.1 In recognition of its internationally important natural features and wildlife, the Severn Estuary is protected by a range of national and international nature conservation designations and associated legislation.

10.1.2 As well as being notified as a Site of Special Scientific Interest (SSSI), it is also designated as a Special Protection Area (SPA) and a Ramsar site. The Severn Estuary is also a candidate Special Area of Conservation.

10.1.3 The SPA designation means that the fields alongside the Estuary that are visited by wildfowl have the same legislative protection as the estuary itself.

10.1.4 South Gloucestershire Council's Core Strategy notes that:

The Habitat Regulations also require an Appropriate Assessment to be carried out to understand the likely impacts of the extant permissions on the European designations and to address mitigation options. This presents a challenge in realising development at Severnside whilst reconciling it with the continued use of the coastal floodplain by wildfowl and compliance with the Habitat Regulations.

10.1.5 The Councils therefore commissioned a separate report from Cresswell Associates/Hyder about the opportunities for mitigating the impact of the existing and planned development in the area covered by the 57/58 permissions and the redevelopment of previously developed land within the Avonmouth area in accordance with the Habitat Regulations.

Local Designations

10.1.6 The study area is also the subject of a number of local nature conservation designations (see plan at Appendix 15), including Sites of Nature Conservation Interest (SNCI) and Wildlife Networks that are shown on Bristol City Council's draft Site Allocations LDF Proposals Map.

10.1.7 There are a also locally designated areas in proximity to the study area, including Local Nature Reserves (e.g. Lawrence Weston Moor LNR that is about 0.5km to the south east of the area).

Protected Species

10.1.8 Surveys, including those that have been submitted to accompany planning applications for development, indicate that protected species are present in the study area.

Cresswell Associates/Hyder Study

10.1.9 The study reviews the 1957/58 Severnside Planning Consent (as required under The Conservation of Habitats and Species Regulations, 2010) to enable the competent authority (South Gloucestershire Council) to undertake an Appropriate Assessment. It also includes an impact assessment of likely development which could take place within the Avonmouth employment area and potentially feasible wind farm sites identified within the Bristol Citywide Sustainable Energy Strategy.

10.1.10 The study is based on assumptions about the areas which were either:

- likely to be lost to the proposed developments within the study area; or

- likely to include processes which would either disturb or displace the aforementioned bird species using adjacent habitats.

10.1.11 The Review of Consent in the study identifies that predicted future development-related habitat losses and disturbance events at Severnside could have potentially significant impacts upon wintering gadwall (a Qualifying Species for the Severn Estuary SPA), and several waterfowl species forming part of the Qualifying Assemblage (specifically gadwall, teal, tufted duck, curlew, mallard, lapwing and common snipe). It is predicted that these impacts could give rise to potentially significant effects upon the integrity of the SPA and Ramsar site.

10.1.12 The study also identifies that future development-related habitat losses, disturbance and displacement at Avonmouth could have potentially significant impacts upon wintering gadwall (a Qualifying Species for the Severn Estuary SPA) and several species forming part of the Qualifying Assemblage (specifically gadwall, teal, tufted duck, curlew, mallard, lapwing and common snipe).

10.1.13 The potential effects of displacement upon waterfowl within the assessment relate to potential feasible wind farm sites only (as identified within the Bristol Citywide Sustainable Energy Strategy (BCSES)) It is predicted that these potential impacts could also give rise to potentially significant effects upon the integrity of the SPA and Ramsar site, either alone or in combination with other plans and projects in the wider surrounds.

10.1.14 The study suggests six areas for potential habitat mitigation measures to offset the identified impacts of development in the study area (see plan at Appendix 10):

Site	Description	Approximate Area
A	Fields North of M4 Bridge	14 ha
B	Fields at Whitehouse Farm	25 ha
C	Hallen Marsh	112 ha
D	Berwick Farm Landfill	30ha
E	Former Northwick Landfill Site	10ha
F	WAP 1 Ecological Refuge Area	38ha
	Total Area	**229ha**

10.1.15 The study recommends that **63ha** (**22ha** from Severnside and **41ha** from Avonmouth) of new wetland habitat is required to off-set the potential impacts which have been predicted in relation to gadwall and the wildfowl species forming part of the Qualifying Assemblage.

10.1.16 The study recommends that the following potential mitigation sites be the subject of further investigation as to their suitability for the creation of new wetland habitat:

- the former Berwick Land fill site (Area D);
- the former Northwick Landfill Site (Area E); and
- the Ecological Refuge Area (F).

10.1.17 The study also recommends that **73.2ha** (**46.6ha** from Severnside and **27.6ha** from Avonmouth) of habitat for waders would need to be created/enhanced to off-set the potential future habitat losses which have been predicted.

10.1.18 The predicted habitat loss at Severnside could affect numbers of lapwing which equate to approximately 1% of the total SPA Qualifying Assemblage. It is therefore also recommended that measures to create/enhance **46.6ha** of the **73.2ha** of habitat for waders be targeted specifically towards lapwings (albeit these mitigation proposals would also be expected to confer benefits to curlew and common snipe, given the degree of overlap between these species' habitat requirements).

10.1.19 The study recommends that the following potential mitigation sites be the subject of further investigation as to their suitability for the creation/enhancement of habitat for waders and lapwings:

- Hallen Marsh (Area C);
- the former Berwick Land fill site (Area D);
- the former Northwick Landfill Site (Area E); and
- the Ecological Refuge Area (F).

10.1.20 The study also notes that there is "*uncertainty as to whether it would be feasible to utilise Areas A & B for use as long-term mitigation areas*", but suggests that the extent of habitat mitigation in Area C could be reduced in size if these areas were suitable for mitigation.

10.1.21 In total, the Cresswell study recommends that ecological mitigation be considered across 6 sites within the study area with a total area of approximately **133.4ha**. Of this total area, **38ha** will be provided in accordance with the requirements of the s106 agreement attached to the WAP 1 permission. This leaves a requirement for a further **95.4ha** of land for ecological mitigation.

10.1.22 The table below summarises the habitat mitigation recommendations identified in the Cresswell study:

Site	Mitigation Requirement	Potential Areas	Approximate Area
	Wetland habitat for gadwall and wildfowl	D, E, F	63ha
	Habitat for waders	C*, D, E, F *Areas A and B could reduce the extent of Area C that is required for mitigation.	73.2ha (of which 46.6ha is required for habitat for lapwings)
	Total Mitigation Requirement		**133.4ha**

10.1.23 The report notes that the identification of the mitigation sites has not considered the issues of flood risk, land use/ownership, existing hydrological conditions, or the presence of other ecology/protected species issues.

10.1.24 The report recommends that the feasibility of habitat creation/enhancement works at the potential mitigation sites should be subject to further investigation (including the willingness of the current

landowners to accommodate such mitigation). Furthermore, it notes that the location and extent of future wind farm development at Avonmouth could significantly compromise the effectiveness of the proposed mitigation sites, and would need to be carefully reviewed. Notwithstanding this, it predicts that, in the event that the requisite levels of mitigation are delivered, significant impacts upon the integrity of the Severn Estuary SPA and Ramsar site would be "unlikely to occur".

10.2 Analysis of the Central Undeveloped Part of the Study Area

10.2.1 The focus of this report is in seeking to identify how the area can best accommodate further economic development to meet its full potential. It is therefore important to consider the opportunity for further development beyond that considered in the Cresswell study.

10.2.2 The main area with potential for further economic development beyond the areas considered in the Cresswell report is the central, undeveloped, green field part of the study area that also includes one of the potential mitigation sites suggested in the Cresswell report (Area C). It is likely that the development of further green field land will require additional mitigation.

10.2.3 The Cresswell study notes that the undeveloped land within the central part of the study area:

predominantly comprises a network of improved grassland fields, which are subject to a heavy grazing regime and bisected by a network of interconnected drainage ditches, and mature hedgerows

10.2.4 Figure 1 (see Appendix 16) and the Description of Terrestrial Habitats in section 3.2 of Appendix III to the study outlines the broad range of habitats present on the green field land within the study area in more detail.

10.2.5 The study concludes that, in principle, the grazing pasture in the central part of the study area "*appeared to be potentially suitable for use by roosting and (to some extent) foraging wintering waterfowl*", although it notes that the majority of the area is surrounded by a network of mature hedgerows and trees which restrict sight-lines.

10.2.6 In particular, the green field land in the north of the central part of the study area is noted as being "*bisected by a well-established hedgerow network which limited the field sizes*". As a result, it was considered less likely that it would support large flocks of wildfowl and waders. However, the study also notes that evidence from other surveys suggests that the presence of these hedges and trees need not inhibit the use of the area by these birds.

10.2.7 The southern part of the undeveloped central area (the potential mitigation Area C identified in the Cresswell study) is however identified as having larger fields with better sight lines and therefore greater potential for use by wintering waterfowl. It is also noted that this area has, from previous surveys, supported relatively low numbers of birds, relative to its large size, diversity of habitat types and low levels of disturbance, etc.

10.3 Mitigation for Additional Economic Development

10.3.1 In addition to the requirements identified in the Cresswell study to mitigate the existing and planned development within the study area, there will be a requirement to identify additional land for mitigation in the event that further green field land is required for economic development.

10.3.2 In this study, we have broadly assumed that the area of land required for ecological mitigation will be broadly the same as the area of additional green field land that is required for economic

development. However, as we have assumed that the density of development on any green field sites will need to include proposals to enhance about 5% of the overall site area for ecology, we have assumed that the additional area of land required for mitigation will comprise 95% of the green field land area required for economic development.

10.3.3 This broad approach is a conservative estimate of the land required for ecological mitigation to facilitate the development of green field land. We have taken this approach in the absence of up to date and detailed surveys of the use of specific parts of the study area by birds using the SPA.

10.3.4 Up to date surveys may indicate that the additional green field land being considered for development is not currently used extensively by species in association with the SPA and that a lesser area of land could be made available to meet the mitigation requirements.

10.3.5 In identifying options for sites to provide ecological mitigation, the optimum solution will be to incorporate as much of the area required in as few sites as possible. The overall approach should therefore be to combine the mitigation required in the Cresswell study with the mitigation required for the development of any additional green field land.

10.4 Mitigation for Infrastructure

10.4.1 Proposals to raise the existing flood defences or develop new flood defences, the raising of land levels and the development of new highways (including the M49 junction and associated spine and link roads) could all have significant effects on the SPA and proposals for ecological mitigation sites. The impact of infrastructure requirements in the study area on the SPA will therefore require investigation as detailed proposals for this infrastructure is brought forward.

10.5 Existing Habitats and Protected Species

10.5.1 Detailed site-specific surveys will be required to determine the biodiversity of sites proposed for economic development and the presence of protected species.

10.5.2 The study area supports a number of protected species. Proposals for the study area should aim to retain and enhance existing important habitats.

10.6 Interaction with GI Requirements

10.6.1 Proposals for ecological mitigation within the study area will need to take into account the requirements for GI corridors running through the study area in both north/south and east/west directions. Areas set aside for ecological mitigation could also form part of the required GI corridors throughout the study area.

10.7 Appropriate Assessment

10.7.1 The preferred option for taking forward the area's economic development, including any associated infrastructure development (including the raising of the existing flood defences and development of a new motorway junction) will need to be the subject of a formal Assessment under the Habitat Regulations to identify if there will be any "significant effects" on the SPA.

10.8 Costs

10.8.1 The costs for preparing sites for ecological mitigation will depend on a wide range of factors including the:

- ecological features of the existing site, including the presence of landscape features and protected species;
- hydrological conditions;
- ground conditions/geology;
- contamination;
- topography;
- land ownership and management requirements; and
- the specific design of the ecological mitigation measures.

10.8.2 Further detailed, site specific information about the above matters will be required to robustly assess the costs of providing mitigation. However, for the purposes of this study, we have assumed that the land required for ecological mitigation will be:

- available at a value that broadly reflects its current agricultural/horse grazing use; and
- suitable for such purposes (including being free from contamination and having suitable ground and hydrological conditions).

10.8.3 The precise cost of preparing and managing land for ecological mitigation will also depend on the precise nature of the works required, but we have identified a similar scheme of mitigation undertaken on about 45ha of Council owned land at Dowlais Farm in Clevedon, North Somerset. The scheme created wetland habitat for use by breeding waders on existing agricultural land.

10.8.4 The overall cost of the works at Dowlais Farm was in the region of £0.6million, equivalent to a cost of about £15k/ha. The work was completed in 2008/9 and we have therefore assumed that similar works today could cost in the region of £20k/ha.

10.8.5 The ongoing management costs at Dowlais Farm are limited because the land continues to be farmed extensively in a manner that supports its ecology.

10.8.6 The mitigation costs for the existing and committed development on the 38ha of land identified in the WAP 1 s106 agreement will be met by the developers of the WAP 1 land. The costs for the remaining 95.4ha of ecological mitigation identified in the Cresswell study are likely to be in the region of:

Item	**Calculation**	**Cost**
Land Acquisition/Agreement Cost	95.4 x £12.5k	£1.2 million
Works Cost	95.4 x £20k	£2 million
Total Cost		**£3.2 million**

10.8.7 The above cost estimate assumes that the sites are suitable for such mitigation and do not require any significant remediation.

10.9 Mitigation Costs – Additional Development

10.9.1 The development of additional land for economic development will require that additional land be set aside for ecological mitigation. On the basis of the above cost estimates, the cost of providing ecological mitigation for 1ha of development land will be in the region of:

Item	**Calculation**	**Cost**
Land Acquisition/Agreement Cost	1 x £12.5k	£12.5k
Works Cost	1 x £20k x 0.95	£19k
Total Cost Per Ha		**£31.5k**

10.9.2 Additional economic development in the study area will require that land be set aside for ecological mitigation. On the basis that an additional area of about 62.7ha of green field land could be brought forward for economic development, the cost of providing ecological mitigation for that land will be in the region of £1.8 million.

10.10 Mitigation Costs – Total

10.10.1 The total cost of ecological mitigation will therefore be in the region of £5 million assuming that suitable land can be acquired at agricultural land values and that ecological mitigation costs will be similar to those at Dowlais farm in North Somerset.

10.11 Phasing

10.11.1 The principal ecological mitigation measures will require the enhancement of existing land within or in proximity to the study area.

10.11.2 The phasing of the ecological mitigation will need to keep pace with development in the study area. However, it is anticipated that an initial phase of mitigation will be required to address development that has taken place to date within the study area.

10.11.3 Site specific ecological mitigation will be required with individual developments.

10.12 Risks

10.12.1 The significant risks associated with the requirements to mitigate the impacts of the area's development on its ecology include:

Risks	**Mitigation**
There are inadequate sites available for ecological mitigation for the existing and planned development in and around the study area.	Review option of providing ecological mitigation away from the study area (this approach is being pursued in connection with the development of the Port's DSTC).

The funding available to undertake the works required to mitigate the impacts of the existing and planned development on the area's ecology is inadequate.	Investigate all potential funding sources.
Development or mitigation has a negative impact on protected species or designated areas.	Undertake site surveys and plan for enhanced habitats to facilitate protected species andother mitigation.
Land owners are unwilling to make land available for ecology mitigation.	Review whether CPO powers could be used to secure land for ecology mitigation. Ensure that a range of different sites are available for mitigation.
Cost of acquiring land for mitigation or providing mitigation are higher.	Investigate opportunities to acquire land with land owners, undertake further investigations on that land and
Further studies reveal that sites identified for mitigation are already being used to capacity by the species for which they are intended.	Undertake detailed surveys of potential mitigation sites.
Sites identified for mitigation are unsuitable.	Undertake more detailed site surveys of ground conditions etc.
Other infrastructure has an adverse impact on the area's ecology.	Assess ecological impacts of other infrastructure requirements (e.g. M49 junction and flood risk mitigation).

10.13 Conclusions

10.13.1 The requirement to mitigate the impacts of the existing and planned development on the SPA is outlined in the Cresswell study. The study sets out mitigation options that will require further investigation to identify whether the sites are suitable and whether agreement can be reached with the current land owners to bring forward that mitigation.

10.13.2 The Cresswell study identifies that 38ha of land will need to be identified for ecological mitigation in accordance with the s106 agreement attached to the WAP 1 permission. A further 95.4ha of land will need to be provided for ecological mitigation for the current anticipated development in the area.

10.13.3 If further green field development is planned within the study area, 1ha of land will be required for mitigation for each 1ha of land to be developed.

10.13.4 The Cresswell study identifies 6 sites that may be suitable for ecological mitigation with a total land area of 229ha. The study therefore identifies about 100ha of land that could be available for ecological mitigation beyond that which will be required to mitigate the impacts of the currently planned development in the study area.

10.13.5 The feasibility of habitat creation/enhancement works at the potential mitigation sites should be subject to further investigation. It is predicted that, in the event that the requisite levels of mitigation are delivered, significant impacts upon the integrity of the Severn Estuary SPA and Ramsar site would be unlikely to occur.

11.0 Transport

11.1 Context

11.1.1 The area already benefits from the presence of the Port and its proximity to the main motorway network that serves south west England, south Wales and beyond. Its location therefore makes it attractive for the development of major warehousing and distribution premises, waste processing (that serves a wide area) and Port related uses.

11.1.2 Further investment in transport infrastructure in the area, particularly in the form of a new motorway junction and the supporting link and spine roads, is likely to further enhance the attractiveness of the area for the development of warehousing and distribution premises.

11.1.3 The Planning Policy section of this report outlines both Councils' long standing desire to secure improvements to the area's transport infrastructure, including a new junction on the M49 to better serve the area. This desire arises from previous work undertaken by the Councils that indicated that the area's transport infrastructure is inadequate and that further development within the area is likely to harm the wider transport network.

11.1.4 Current development plan policies also seek to enhance public transport and opportunities to walk and cycle to and from the study area.

11.1.5 The area's development over the last 10 years does not appear to have been hindered by the absence of the transport infrastructure identified in current and emerging development plan policy. However, the Councils remain concerned that the continuing development in the area (particularly of the undeveloped areas covered by the 57/58 permission) will result in unacceptable transport implications that could deter future investment in the area and harm the amenity of people living in proximity to existing routes.

11.2 M49 Junction

11.2.1 This study does not include modelling of the transport impacts of development on the area, but instead relies on the conclusions that have informed development plan policies to date. These emphasise the need to provide a new M49 junction to serve the planned growth in the area. We have assumed that a new motorway junction will be necessary to serve development in the area to 2050 and beyond and that the transport implications of development without the junction will be unacceptable.

11.2.2 Proposals for a new M49 junction and associated linking roads are shown in:

- various development plan documents (see section 3.0);
- the outline planning application for the WAP 1 development (see section 2.4); and
- current marketing material for the Central Park development (see Appendix 17).

11.2.3 Both Councils have therefore, for some time, held aspirations to enhance the area's accessibility and to mitigate the transport impacts of development by way of a new M49 junction and other transport infrastructure.

11.2.4 The new M49 junction and the associated spine and link roads are the most significant transport infrastructure identified in development plan documents (excluding Bristol Port's DSTC).

11.3 Other Studies

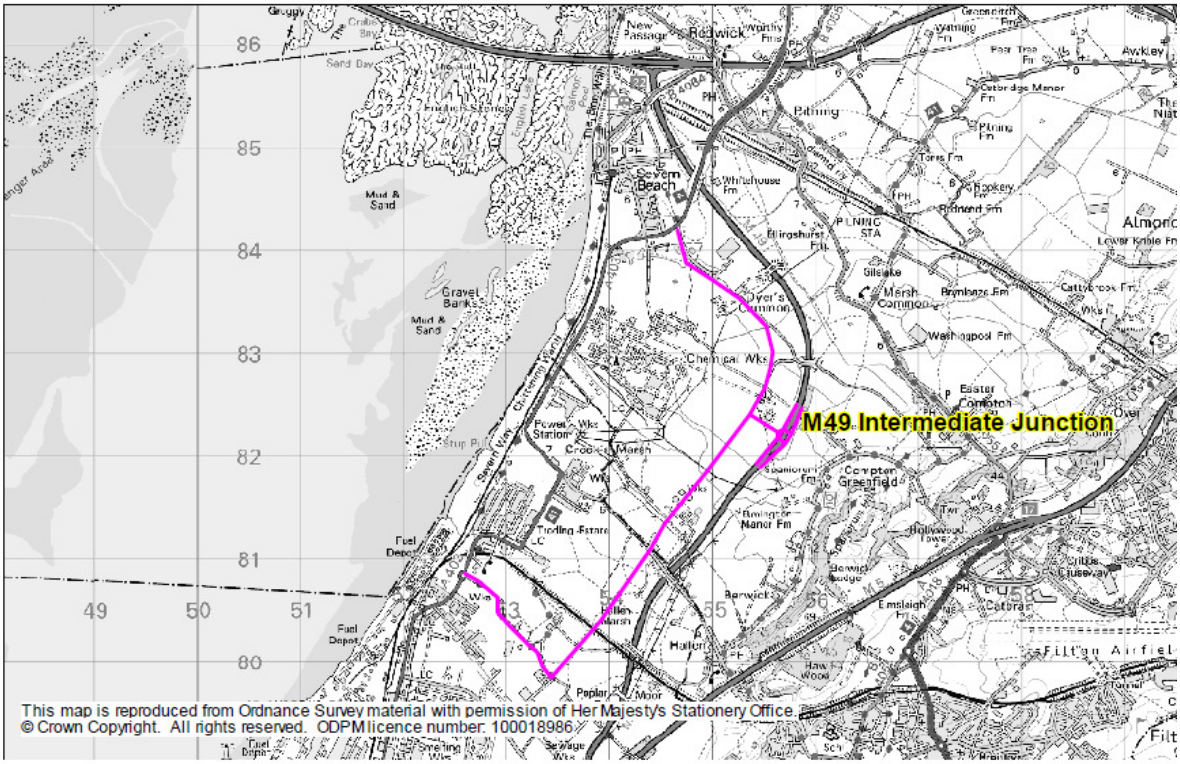
11.3.1 The costs and benefits of a new M49 junction were examined in the West of England Partnership's Greater Bristol Strategic Transport Study (GBSTS - http://www.westofengland.org/transport/gbsts). At the time of the study (2006), only modest growth was assumed within the area and it concluded:

M49/Severnside Intermediate Junction

Projected increases in employment within the Severnside area are not sufficient to justify the potential highway improvements which include a new junction on the M49 and construction of a Spine Road through the main development area. While there are potential travel time savings for traffic to/from Severnside, the volume of traffic is small and the benefits do not justify the high scheme costs.

Extract from GBSTS Showing M49 Junction and Spine Road

Figure 6.24 – Alignment of M49 Intermediate Junction



Note: The schemes in this diagram are conceptual and defined for appraisal purposes.

11.3.2 We have not examined the planned growth anticipated in the study area in the GBSTS, but the purpose of this report is to look forward to 2050. If the Councils are to realise their shared vision to 2050, it is likely that development in the study area will be greater than that anticipated in GBSTS.

11.4 M49 Junction Location

11.4.1 It may be possible to develop a new M49 junction in a number of different locations. The documents studied to inform this report illustrate three different options in the:

- indicative plan in the South Gloucestershire Local Plan (see section 3.7.6);
- plan in the WAP 1 s106 agreement (see section 2.4); and
- plan above (in section 11.3.1) from the GBSTS study.

11.4.2 However, as outlined in section 5.0, the HSE's PADHI guidance states that Major Transport Links in their own right (i.e. not as an integral part of other developments) fall within sensitivity Level 2 where the HSE would normally advise against such development within Inner Consultation Zones. The HSE may advise that the junction should, from a health and safety perspective, be located further north or south than is shown in each Council's indicative plans within their Local Plans and Core Strategies to avoid the LNG Inner Consultation Zone. Discussions will be required with the HSE about the options for the location of a new M49 junction.

11.4.3 The junction would need to be linked to the existing highway network in the area, including the A403. Previous developments in the area have also incorporated new highways to link to the anticipated "spine road" that is shown as an indicative route on the plans in section 3.0 linking the Avonmouth and Severnside areas in parallel to the A403.

11.4.4 The developers of Central Park, Severnside Distribution Land Ltd have been progressing the development of the section of a "spine road" through the area covered by the 57/58 permissions (see marketing brochure at Appendix 17). Aerial photographs taken in January 2012 illustrate that the road is under construction across their site (see photo below taken from http://www.centralparkbristol.co.uk/).

11.4.5 Planning permission has also now been granted to SITA UK for the development of an Energy Recovery Centre on site SG39 South of Severnside Works in the JWCS (http://www.westofengland.org/media/202981/jwcs%20-%20full%20page%20v8.pdf) under the reference PT09/5982/FMW. The permission includes a new roundabout on the A403 and a section of "spine road" along the site's southern boundary that could form part of a link to the spine road that is being developed through the Central Park development (see the plan at: http://developments.southglos.gov.uk/online-applications/files/055377E024B9C761B47965D3D63C552A/pdf/PT09_5982_FMW-PROPOSED_A403_ROUNDABOUT___SPINE_ROAD-_03_12_09-3693215.pdf). This is illustrated on the plans at Appendix 10.

11.4.6 The Transport Assessment that accompanied the SITA application states that the new roundabout and road "*will be designed to form the southernmost section of a new Severnside spine road*". It also states that it was the applicant's understanding that it will serve as the primary route through Severnside and that the A403 will be downgraded and that all HGV traffic will use the spine road.

11.4.7 A new M49 junction should be linked to the spine road that is being developed through the Central Park development.

11.5 M49 Junction Benefits

11.5.1 South Gloucestershire Council's evidence suggests that the development of a new M49 junction would provide benefits that include:

- diversion of traffic flows away from other motorway junctions in the area;
- reduced traffic flows in the morning and afternoon peak hours at junctions 18/18A on the M5;
- reduced traffic flows on some of the local routes in the area, including routes to the east of Severnside; and
- improved transport links to the study area that could further enhance the area's accessibility for storage and distribution uses.

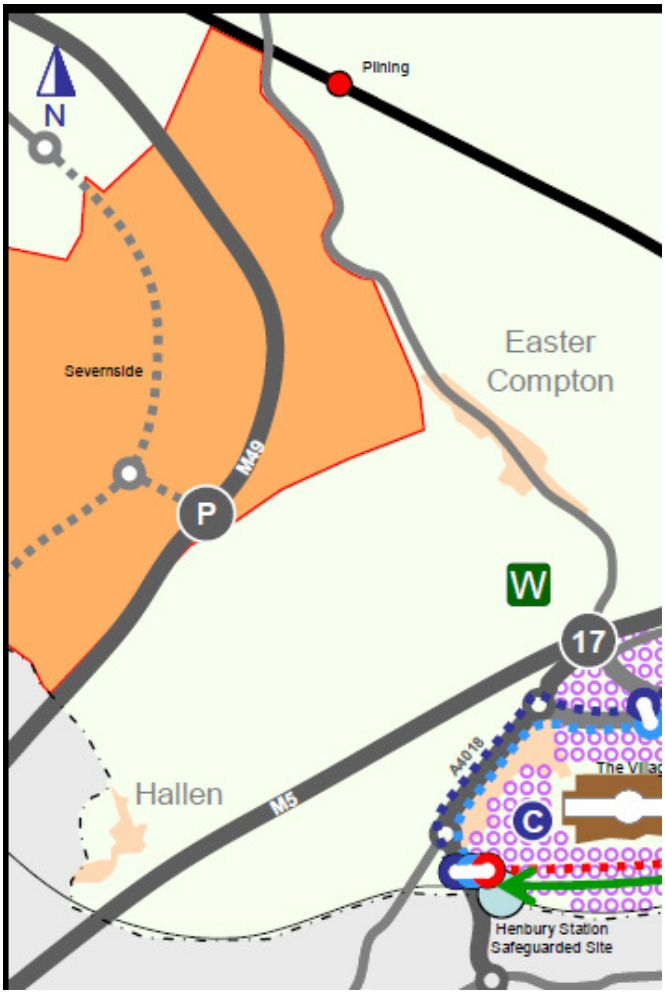
11.5.2 A new junction may also help to attract investment to the area and may provide some enhancement to the land values in the vicinity of the junction (see separate report – Avonmouth Severnside Outline Development Strategy)

11.5.3 The development of a new junction could also serve to provide an additional access to the area to provide a means of escape in the event of the flood risk materialising in the area.

11.6 M49 Junction Cost

11.6.1 Detailed proposals have not been prepared for a new M49 junction. As outlined elsewhere in this report, proposals for a new M49 junction have been carried forward from earlier work that supported the need for a new junction to serve the Avonmouth and Severnside area. The outline proposals for a new junction are now being carried forward in South Gloucestershire's Core Strategy (see extract from Figure 3 of the Core Strategy below).

Extract from South Gloucestershire Council **Core Strategy (Figure 3)**



11.6.2 South Gloucestershire Council's Infrastructure Delivery Plan (February 2011) (see: http://www.southglos.gov.uk/NR/rdonlyres/E32CE1D0-9DE9-400A-8CED-3415C4E9373A/0/PTE110068.pdf) states that the cost of a new M49 junction is "unknown".

11.6.3 However, the cost of providing an M49 junction is included in the West of England Partnership's Report: Responding to Infrastructure Delivery and Planning Issues in the West of England that was prepared by Roger Tym and Partners in May 2010 (http://www.westofengland.org/planning--housing/reports). The cost is estimated at £42m and it is understood that this sum derives from South Gloucestershire Council's earlier analysis. This report relies on this cost estimate.

11.6.4 However, in concluding that the earlier cost estimate is appropriate for use in this study, we have investigated the publicised costs of other recently completed and planned new motorway junctions in England. Our research identified a number of other new, proposed or recently completed motorway junctions:

- a new junction 10a on the M20 near Ashford has been costed at £66m to £90m although this has a double over bridge and a higher specification than would be required at Avonmouth and a significant dualled approach

(http://www.highways.gov.uk/roads/documents/S080083_M20_J10A_Newsletter_web_version.pdf);

- a new junction 29a serving Markham Vale in Derbyshire was implemented in 2007 and its cost has been reported as approximately £20m. This is a lower key junction than is likely to be required at Avonmouth that provided new slip roads to link to existing bridges under and over the M1; and
- a new junction on the M275 at Tipner in Portsmouth is proposed at a cost of £45m (including a park and ride facility and priority bus lane and an allowance for optimism bias), but this does not include an overbridge and will use the existing bridges and part developed slip roads that were developed some time ago (http://idox.portsmouth.gov.uk/LICWAM/doc/Revised%20Drawing-358375.pdf?extension=.pdf&id=358375&appid=1001&location=FromUKP&contentType=application/pdf&pageCount=1).

11.6.5 These schemes broadly support the cost estimate in Roger Tym and Partners report of 2010 and we have therefore relied on it in this study. We have assumed that this cost includes a contribution towards the cost of providing the new link roads that would be necessary to serve the junction (these costs could vary depending on the detailed scale, design and location of these roads).

11.6.6 A further detailed review of the options for locating the new junction and alternative design solutions, or solutions that take advantage of existing routes in proximity to the M49 may reveal alternative lower (or higher) cost solutions than have been identified in published documents to date. Further detailed work will be required to verify the £42m cost estimate in the event that proposals for a new M49 junction are taken forward.

11.6.7 A more detailed review of the options for a new M49 junction will need to take into account the work undertaken by Severnside Distribution Land Ltd in developing a spine road through their land holding in the Severnside area that now extends in a southerly direction in proximity to the LNG plant (see paragraph 11.4.4 and http://www.centralparkbristol.co.uk/news/site-progress-august-2011/).

11.6.8 Although current development plan policies set out the need for a new M49 junction to serve the planned growth in the study area, the Joint Local Transport Plan 3 (that was published in March 2011: http://travelplus.org.uk/media/205985/jltp3%20march%202011.pdf) does not include proposals for a new M49 junction to support the current and emerging development plan policies in the period to 2026.

11.7 Other Transport Improvements

Highway Improvements

11.7.1 Paragraphs 11.4.4. to 11.4.6 above highlight the ongoing highway developments through the area covered by the 57/58 permission.

11.7.2 Other highway improvements in the area have been identified through, and would be funded by, s106 agreements for development in the study area, including improvements to the junction of Kings Weston Road and St Andrews Road and the Rhodia site access.

11.7.3 It may be necessary to secure other minor highway improvements throughout the study area as a result of specific development proposals, but this study assumes that these would be investigated

and developed on a site by site basis in the context of specific development proposals. We have assumed that the costs of any such improvements would be met by the developers of the sites that they would serve.

Traffic Management

11.7.4 Traffic management on the roads leading to the study area from the east has been identified by South Gloucestershire Council as an area where improvements are required to mitigate the impacts of traffic living in communities along those routes.

11.7.5 In the absence of more detailed proposals for the development of such a scheme, it is not possible to provide an indication of the cost of any such proposals. However, where it is able, South Gloucestershire Council is currently seeking s106 contributions from developers in the Severnside area towards off site traffic management measures. South Gloucestershire Council has most recently sought such a contribution (of £0.2 million) from the developer of a 40 ha site in its area (http://developments.southglos.gov.uk/online-applications/applicationDetails.do?activeTab=documents&keyVal=L9T8PZOK02P00). We anticipate that both Councils will continue to seek s106 contributions towards off site transport management measures that are required to mitigate the impacts of specific development proposals on the highway network in the area (although the ability to achieve this in the areas covered by the 57/58 permissions will be limited).

Cycling and Walking

11.7.6 There is a network of existing cycling and walking routes within the study area. Although it would be possible to develop new cycle and walking routes throughout the area, due to the layout, nature of uses that exist (and that are likely to be developed in the future), shift patterns and distance from residential communities, it is unlikely that walking or cycling will make a significant impact upon the car based nature of trips to and from the study area.

11.7.7 It is anticipated that where such facilities are required to mitigate the impact of specific development proposals within the study area, the Councils will seek s106 contributions towards such measures and will promote them via travel plans. Furthermore, where routes need to be reserved through development sites, we anticipate that these could be secured through planning conditions and s106 obligations. The ability to secure this transport infrastructure will however be limited within the area covered by the 57/58 permissions.

Public Transport

11.7.8 Public transport within the study area includes buses and trains. The existing bus services are generally restricted to the northern and southern developed parts of the area. Existing passenger train services are restricted to the Severn Beach line that has stations within the study area at Avonmouth, St Andrews Road and Severn Beach. The existing passenger train line is connected to Bristol Temple Meads.

11.7.9 It is highly unlikely that bus services would operate successfully on a commercial basis within the Avonmouth/Severnside area due to the low density of employment, difficult shift patterns and difficulty of a bus route to be located within a reasonable walking distance of centres of employment.

11.7.10 Future development within the area is likely to be at a similarly low density to the existing development and is unlikely to make public transport significantly more viable in the period to 2050.

11.7.11 However, there is some potential for travel planning to reduce single occupancy car travel to and from the area by increasing the opportunity for car sharing. The opportunities for car sharing could be promoted as part of an area wide travel planning initiative. As a result of such an initiative, opportunities for enhancing public transport provision may become evident.

Rail Passengers

11.7.12 The Severnside Community Rail Partnership's Progress Report of January 2011 (http://travelplus.org.uk/media/212461/severnside%20crp%20report%20jan%202011.pdf) confirms the number of passengers using the stations (both boarding and alighting) on weekdays in the study area in 2008, 2009 and 2010:

Station	**2008**	**2009**	**2010**
Severn Beach	107	135	143
St Andrews Road	19	18	24
Avonmouth	294	243	323

11.7.13 The figures illustrate the relatively low use made of the train services in the context of the number of employees in the study area.

11.7.14 Although the possibility of providing additional rail stations along the existing railway line in the area exists, additional stations are unlikely to be viable and none are currently proposed within the Local Transport Plan 3 or either Council's development plan documents (although both the Bristol and South Gloucestershire Core Strategies highlight an opportunity to reintroduce a "*local passenger rail service between Avonmouth and Filton (Henbury Loop)").*

Rail Freight

11.7.15 Bristol Port is currently served by an existing rail freight line. The Great Western Route Utilisation Strategy March 2010 (http://www.networkrail.co.uk/browse%20documents/rus%20documents/route%20utilisation%20strategies/great%20western/great%20western%20rus.pdf) notes that Avonmouth currently has "*limited container movements*", but recognises the growth in rail traffic that could arise from the planned Deep Sea Container Terminal (DSCT) at the Port. However, in granting the Harbour Revision Order for the DSCT, the DfT noted that agreement had been reached with Network Rail that this demand could be accommodated without the provision of significant additional capacity on the existing rail network.

11.7.16 The Port is likely to be the greatest user of the existing freight line in the area and it is therefore unlikely that any substantial upgrade to the existing rail network will be required to accommodate further development elsewhere in the Avonmouth and Severnside area. Investment in rail infrastructure for freight is therefore unlikely to be necessary to serve the area's further development to 2050.

11.7.17 The other rail freight opportunity in the area arises from the proposals by SITA UK (see section 11.4.5 above) to potentially import and export waste by rail to their planned ERC facility. SITA stated that there was a reasonable prospect of utilising rail before 2026 and that the rail linkage had been one of the key factors which made them purchase this site.

11.7.18 SITA's planning permission requires a regular review of the viability of developing the rail sidings (including the upgrading the signalling on part of the Severn Beach branch line from a one-train system, reinstating the link from the sidings to the branch line and upgrading the sidings, including the track beds, the rails and siding signalling). It requires that they review the economic viability of transporting waste to the site by rail on a 2 yearly basis.

11.7.19 In the event that viability of transporting waste to the site by rail is proven, this opportunity to increase rail freight activity in the area may come forward in the future.

Bristol Port

11.7.20 An Economic Assessment of Bristol Port was undertaken by Roger Tym and Partners on behalf of SWRDA in 2004 (http://www.southwesteip.co.uk/downloads/documents/20061231182214.pdf). At that time, the study noted the land available for the Port's expansion was "*running out*" and noted the need to consider the Port's requirements for expansion (both within the Avonmouth and Royal Portbury Docks areas).

11.7.21 More recently, the Port has secured the necessary approvals to develop a Deep Sea Container Terminal (DSCT). This facility will be developed beyond the existing land area into the estuary by, inter alia, raising levels and developing a new quayside. The development will be privately funded by the Port.

11.7.22 The extent of the proposed DSCT is shown broadly on the plan at Appendix 8. The completion of the DSCT is likely to place further demand for land within the area for port related development. The precise extent of that demand is unknown.

11.8 Phasing

11.8.1 The key transport infrastructure identified in this study is the development of a new M49 junction. Analysis will be required to establish the point at which further development in the study area would make the development of the M49 essential to mitigate the cumulative transport impacts of development.

11.8.2 The other transport infrastructure identified in this study is already being developed or will be brought forward in association with the individual developments within the study area.

11.9 Risks

11.9.1 The risks in connection with the transport infrastructure are set out below:

Risks	**Mitigation**
Highways Agency objects to development of new motorway junction.	Ensure close consultation with the Highways Agency.
Cost estimate for motorway junction is inaccurate.	Develop and cost more detailed proposal for motorway junction and link roads and undertake ground investigations.
Assumptions upon which transport modelling is based vary leading to an under/over statement of the impacts of development on transport infrastructure.	Review assumptions and monitor on-going development in the study area.

11.10 Conclusions

11.10.1 The evidence of significant ongoing investment in warehouse and distribution uses within the study area illustrates the area's continuing attraction for such uses that is at least partly based on its location in proximity to the strategic highway network.

11.10.2 The Councils remain committed to bringing forward a new M49 junction and other transport improvements to enhance the area's accessibility and to make the area more attractive for business investment.

11.10.3 The Council's development plans set out proposals to bring forward a new M49 junction based on historic evidence. The cost of developing a new M49 junction has been estimated at £42m, but a thorough review of the options for developing a new junction is now required, taking into account the HSE Inner Consultation Zones and other factors. The review of the options will need to investigate the costs and deliverability of those options and will need to re-examine the earlier evidence that supports the need for the new junction.

11.10.4 Although improvements to encourage walking, cycling and an increased use of public transport in the area are desirable, such improvements are unlikely to significantly change the proportion of employees and visitors travelling to and from the area by car because of the relatively low density of uses, large plot sizes and shift working patterns.

11.10.5 There is however likely to be a requirement to undertake localised improvements on the highway network in the period to 2050, either directly in association with development proposals or to improve existing sub standard junctions.

11.10.6 Further work could be undertaken to assess the opportunity to implement traffic management measures on the rural roads leading to and from the site. However, any such study should be undertaken on a comprehensive basis to ensure that the implications of introducing such measures on specific routes are fully understood and do not result in adverse impact son other routes.

12.0 Flood Risk and Drainage

12.1 Context

12.1.1 The study area is low lying and adjacent to the Severn Estuary with the mouth of the River Avon to the south west. The area is drained by a large network of artificial rhynes and control structures. The Environment Agency's current flood mapping of the area shows that it is wholly within Flood Zone 3 i.e. the 1 in 200 year tidal floodplain of the Severn Estuary (see plan on following page and at Appendix 18).

12.1.2 The tidal defences that serve the area are sub-standard. Current defences along the estuary provide a variety of standards of protection ranging between 1 in 10 at the Port Lock Gates to 1 in 200. Even though the area is protected by a combination of Environment Agency and privately maintained defences (e.g. Bristol Port) these vary in terms of design and materials. The defences do not therefore provide protection to the required standard (as set out in PPS25) either now or to accommodate the effects of climate change over the lifetime of the development.

12.1.3 The Environment Agency's recommended standard of protection for new development to be safe from tidal flooding is 1in 200 years plus an allowance for climate change. The current defences along the sea frontage do not provide this level of protection.

12.1.4 Current climate change predictions indicate a sea level rise of approximately 1m by 2105 that would lead to significant overtopping of the existing defences. In the event of a tidal flood, this would lead (using the DEFRA "Flood Risks to People" flood hazard category system) to "danger for most"/"danger for all" across the area.

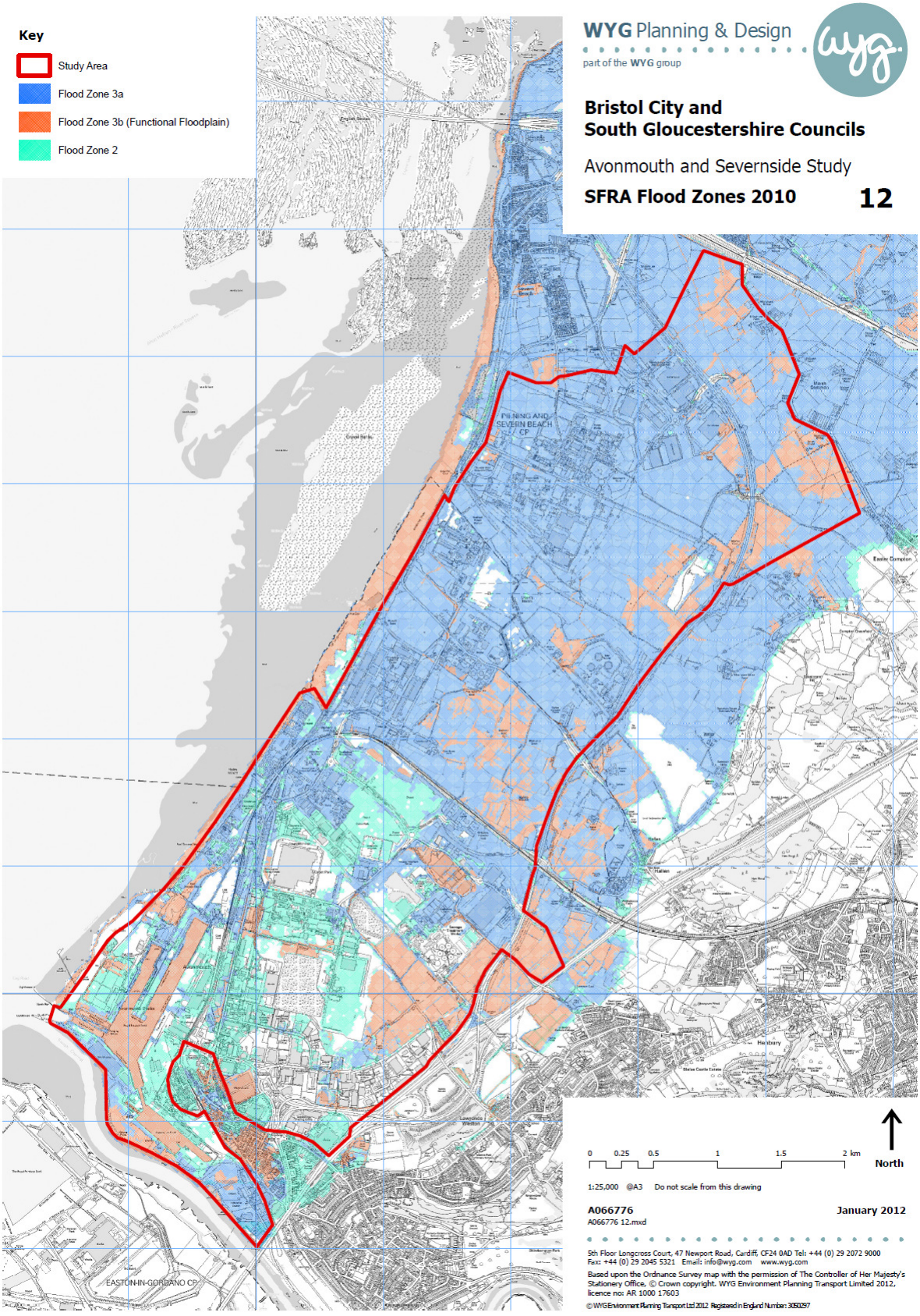
12.1.5 It is therefore of vital importance to the existing and planned development in the area that the increasing risks from tidal flooding are mitigated on a strategic basis to help enable sustainable development. In the absence of a strategic solution to the risk of tidal flooding in the area, development in the area is unlikely to be sustainable.

12.2 Market Perception

12.2.1 The majority of the study area is, with the effects of climate change, at an increasing risk of tidal flooding. However, in advance of examining the technical issues, it is worth noting the comments in the Annexes to Bristol City Council's Employment Land Review (http://www.bristol.gov.uk/sites/default/files/documents/council_and_democracy/statistics_and_census_information/employment-land-study-annexes-to-final-report-Feb09.pdf) that state:

We have been asked to comment on market perceptions of flood risk in Avonmouth/Severnside. At present, despite large areas of Avonmouth and Severnside being within the River Severn flood plain and widely publicised general threats of global warming, rising sea levels and increasing flood risk in such areas, market sentiment is currently not reflecting these concerns. Clearly, should there be a significant flood in this area in the future this would have a dramatic detrimental impact on Bristol's industrial land provision and there would also be an adverse market reaction to land and buildings in the affected area which is dominated by factories and warehouses.

12.2.2 Although "*market sentiment*" is not currently reflecting concerns about flood risk in the area, this statement highlights the need to ensure that flood risk in the area is managed to avoid a "*dramatic detrimental impact on*" Bristol and South Gloucestershire's "*industrial land provision.*"


Key
Study Area
Flood Zone 3a
Flood Zone 3b (Functional Floodplain)
Flood Zone 2
WYG Planning & Design
part of the WYG group
Bristol City and
South Gloucestershire Councils
Avonmouth and Severnside Study
SFRA Flood Zones 2010
12
PILNING AND SEVERN BEACH CP
EASTON-IN-GORDANO CP
0 0.25 0.5 1 1.5 2 km
North
1:25,000 @A3 Do not scale from this drawing
A066776
A066776 12.mxd
January 2012
5th Floor Longcross Court, 47 Newport Road, Cardiff, CF24 0AD Tel: +44 (0) 29 2072 9000
Fax: +44 (0) 29 2045 5321 Email: info@wyg.com www.wyg.com
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12.3 Current Approach to Development Management

12.3.1 The Environment Agency and both Councils acting as local planning authorities have to date, notwithstanding the increasing risk to the area from flooding, supported proposals for development within the study area on a case by case basis. The approach taken by the authorities in determining planning applications for development within the area (and the Secretary of State on appeals) has been to:

- review development proposals on a case by case basis;
- acknowledge that planning policies are generally supportive of proposals to redevelop previously developed land for employment development (principally B2, B8 and sui generis uses) within the study area;
- accept that much economic development meets the requirements of the Sequential Test on the basis that there are no alternative sites available that are at a lower risk of flooding in the area;
- accept that employment development is "less vulnerable" and appropriate in Flood Zone 3a; and
- require on site flood mitigation in the form of localised land raising (for example of building footprints and external storage areas) and flood evacuation/emergency plans to mitigate the risks of flooding; and
- require that flood risk assessments demonstrate that development will not increase the risk of flooding elsewhere.

12.3.2 However, the Environment Agency and Councils recognise, in the context of the SFRA 2 that was published in March 2011, that it is not desirable to continue to deal with development proposals in the area on a case by case basis and that a long term, comprehensive, strategic solution is required to reduce the risk of tidal flooding in the area and to enable the area to reach its full potential.

12.3.3 For the purposes of this study, we have assumed that further economic development within the study area is unlikely to be acceptable to the Environment Agency and the Councils in the absence of strategic mitigation for flood risk in the area.

12.4 Surface Water Drainage and Lower Severn Internal Drainage Board

12.4.1 The majority of the study area has specific drainage problems which necessitates its inclusion within the area administered by the Lower Severn Drainage Board. The Board is responsible for administering surface water drainage in the area highlighted in the map below that includes the entire study area.

Map of Extent of Lower Severn Drainage Board Area (from http://www.lowersevernidb.org.uk/development.html)

Surface Water

12.4.2 Development, including proposals for new infrastructure and improvement to the area's flood defences will need to consider the detailed implications on surface water drainage from the area. Modelling will be required to assess the implications of climate change and sea level rise on surface water drainage in the area in the context of the full development of the 57/58 permissions.

Infrastructure Levy

12.4.3 The Board's Guide for Development Within the Avonmouth/Severnside Area Draft Strategy states that it will levy an infrastructure charge of £25k per hectare of new development within the study area (with a reduction for work undertaken in kind that is of benefit to others in the catchment area). This charge is applied to all new development, but excludes development that benefits from the 57/58 permissions.

Maintenance Responsibilities

12.4.4 The Board will enter into maintenance agreements for the adoption of strategic ponds and rhynes in the area. Such agreements include commuted sums for maintenance that are calculated by the Board.

Costs

12.4.5 The costs identified above are common to and applicable across the whole study area and are therefore likely to be reflected in land values in the area.

12.5 Flood Risk

12.5.1 The study area is adjacent to the Severn Estuary and much of it is relatively low lying and at risk of flooding. Although the area is partially protected from the risk of tidal flooding by existing sea defences, many of these defences have not been developed and are not maintained formally as flood defences.

12.5.2 The Project Brief requires that we "*establish what is required to "hold the line" in terms of flood defence?*" "Hold the line" broadly refers to the policy of maintaining the existing flood defences and control structures in their present positions, and increasing the standard of protection against flooding in some areas.

12.5.3 The draft Severn Estuary Shoreline Management Plan 2 (SMP2) states that the short term (0-20 years) policy adopted in relation to the flood defences in the area is "hold the line". The "hold the line" position will however change with time as sea levels are predicted to rise to 2050 and beyond.

12.5.4 The study area is at increasing risk of tidal flooding with climate change. Parts of the study area are also at risk of fluvial flooding, but the greatest risk to existing development in the majority of the study area arises from tidal flooding.

12.5.5 The Councils commissioned SFRA to inform their local development frameworks and individual development proposals that continue to come forward within the study area. The Councils, together with the Lower Severn Drainage Board, published the SFRA 2 - Avonmouth/Severnside Summary Report in March 2011. This and the current SMP provide the principal evidence in respect of flood risk that informs this report.

12.5.6 Planning policies seek to direct new development to areas at least risk of flooding. If further development is to be accommodated within the study area, it is essential that decisions about the scale, location and nature of that development are taken in the context of an analysis of the risks of flooding and the options for mitigating these.

12.5.7 This Report is accompanied by a Flood Risk Management Study prepared by Buro Happold at Appendix 6. The Study was prepared to specifically examine the flood risks within the study area

and options for mitigating those risks to better protect existing development and facilitate further economic development within the study area to help the area achieve its full potential.

12.6 Strategic Flood Risk Assessment – Level 1

12.6.1 The Councils have separately commissioned Strategic Flood Risk Assessments - Level 1 (SFRA 1) for their areas in accordance with guidance in PPS 25 – Development and Flood Risk. Bristol's SFRA 1 is available at:

http://www.bristol.gov.uk/sites/default/files/assets/documents/Bristol%20City%20Level%201%20Final.pdf

and South Gloucestershire's is available at:

http://www.southglos.gov.uk/NR/rdonlyres/72D86103-23D7-45C3-8033-4345C3BE1FD7/0/PTE090113.pdf

12.6.2 The SFRA 1 were prepared to inform the preparation of development plan policies, particularly those that relate to flood risk and the allocation of land for development, including each Council's Core Strategy and Site Allocations Development Plan Documents. Each SFRA 1 covered the whole of each Council's area and did not therefore focus specifically on the Avonmouth/Severnside area.

12.6.3 The SFRA 1 have been used to inform Sustainability Appraisals that have examined different development and growth options in each Councils area and, in particular, whether it is possible to accommodate all development requirements within areas with a low probability of flooding.

12.6.4 In the event that it is not possible to accommodate all development in areas at a low probability of flooding, the SFRA 1 are used to inform the "Sequential Test" that is required to assess the suitability of development in areas at higher risk of flooding, such as the study area.

12.6.5 South Gloucestershire Council's SFRA 1 recommends that:

"*for the continued development of Avonmouth/Severnside, a strategy to provide improvements to existing infrastructure to accommodate growth is recommended. This may incorporate the improvement and maintenance of existing flood defences.*"

12.7 Strategic Flood Risk Assessment – Level 2 (SFRA 2)

12.7.1 Each Council's SFRA 1 identified the need for an SFRA 2 for the Avonmouth/Severnside area.

12.7.2 Bristol City Council also commissioned a Citywide SFRA 2 (available at: http://www.bristol.gov.uk/page/strategic-flood-risk-assessment-sfra) that examined flood risk in the Avonmouth area and recommended that flood defences in the area be raised and extended to reduce the flood risk and mitigate climate change impacts in the area, It recommended that the options for doing this be the subject of a separate study (the SFRA for the Avonmouth and Severnside area).

12.7.3 The Councils and the Lower Severn Drainage Board commissioned the SFRA 2 for this coastal area. The SFRA 2 covers a wider area than the current study by including land to the north and east. A summary of the SFRA 2 is available at:

http://www.southglos.gov.uk/NR/rdonlyres/EBD282FB-B1D2-4D42-A4C6-E40CE07DA1FA/0/PTE110072.pdf

or

http://www.bristol.gov.uk/sites/default/files/assets/documents/Avonmouth_SummaryReport_Phase4_Final_v3b.pdf

The associated Technical Report is available at:

http://www.bristol.gov.uk/sites/default/files/assets/documents/Avonmouth_TechnicalReport_FINAL_v4a.pdf

12.7.4 The SFRA 2 provides a more detailed assessment of flood risk issues in the Avonmouth and Severnside area to enable the Councils to assess flood risk in increasing detail as they progress their LDF and consider the allocation of land for development within the area.

12.7.5 The main objectives of the SFRA 2 are to provide flood information:

- so that an evidence based and risk based sequential approach can be adopted when making planning decisions, in line with PPS 25;
- that is strategic in that it covers a wide spatial area and looks at flood risk today and in the future;
- that supports sustainability appraisals of local development frameworks;
- that identifies what further investigations may be required in flood risk assessments for specific development proposals.

12.7.6 The SFRA 2 notes that the Environment Agency has advised that any future development should take full account of flood risk and be based on the appropriate application of the risk-based sequential approach advocated in Planning Policy Statement 25 – Development and Flood Risk (PPS25):

http://www.communities.gov.uk/documents/planningandbuilding/pdf/planningpolicystatement25.pdf

12.7.7 The SFRA 2 results indicate that the level of protection provided by the existing tidal defences is likely to reduce significantly in the future due to the effects of climate change, principally increases in sea level and increased 'storminess' and wave overtopping. If defences are not improved, the frequency and severity of flooding in the future is such that existing and planned development is unlikely to be sustainable. The SFRA 2 findings demonstrate that there is a need to upgrade the defences (both condition and design standard) and maintain them in the future to sustain development in the area.

12.7.8 The SFRA 2 Summary Report notes in particular at paragraph 9.52:

Improvements to defences are considered essential for the Avonmouth/Severnside area to remain viable in the future given the scale of future flooding expected due to climate change.

12.8 Severn Estuary Flood Risk Management Strategy (SFRMS) - Managing Flood Risk on the Severn Estuary (January 2011)

12.8.1 On a broader scale, the Environment Agency consulted on its emerging SFRMS in January 2011. The consultation covers the area in this study. The aim of the Strategy is to identify how the EA can best manage flood risk in the area over the next century. An extract from the consultation document is attached at Appendix 19.

12.8.2 One of the principal concerns raised during the consultation was the proposal to allocate areas of farmland for the creation of inter-tidal habitat to maintain a balance of wildlife habitat within the estuary. The Agency is now refining its approach and hopes to reduce the area of land required for inter-tidal habitat and to work with landowners to create that habitat.

12.8.3 The consultation document notes that although the typical chance of flooding in the area is 1 in 100, locally the risk can be 1 in 20 (although the standard of protection is as low as 1 in 10 at the Port Lock Gates (see paragraph 13.1.2). This is well below the Environment Agency's recommended standard of protection for new development to be safe from tidal flooding (1 in 200 years plus an allowance for climate change (see Appendix 5)). It notes that, in the future, as sea levels and storminess increase, the level of flood risk in the area will increase. After 2030, works will be required to the raise the existing defences to keep pace with climate change and if the defences are not improved after 2060, there is a risk of annual tidal flooding.

12.8.4 The existing defences will therefore need to be increased in height to bring them up to the 1 in 200 year standard of protection today, and will either needed to be further increased in height in the future, or future proofed with an increased height today, to take account of climate change.

12.8.5 The Strategic Environmental Assessment accompanying the consultation suggests that the nature conservation sites that are seaward of the flood defences may be adversely impacted by the increased footprint that would be required from the raising of the flood defences. The seaward areas will, assuming that the existing defences are maintained, be the subject of "coastal squeeze" as sea levels rise and the habitats become eroded. It therefore concludes that the additional impact over and above that which will arise from climate change and increasing sea levels is unlikely to be "significant".

12.8.6 The consultation documents also note that the existing flood defences in the area are contributing to some habitat loss because they stop the estuary naturally adjusting its shape as sea levels rise. It suggests that the Government is legally obliged to put back the habitat that is lost from this process and that without the habitat being replaced, it may be necessary to stop maintaining or improving the flood defences.

12.8.7 This study has not examined the implications (legal and technical) of maintaining or raising the existing tidal defences on the tidal habitats to the west of the existing flood defences. The impact of maintaining (or improving) the existing flood defence on these habitats will require further investigation – both from a technical and legal perspective. The implications arising from the Environment Agency's consultation documents could be significant. It is however unlikely that they could be resolved within the study area alone and would therefore need to be addressed through the wider Management Strategy for the Estuary.

12.8.8 For the purposes of this study, we have assumed that the impacts of maintaining or raising the flood defences (to reduce the risk of flooding in the study area) on the ecology of the estuary to the west of the defences will be resolved via an approach that considers the Estuary as a whole and that the costs of delivering the wider SFRMS will be met separately.

12.9 Tidal Flood Risk

12.9.1 Strategically, the biggest factor influencing flood risk in the area is the tide levels in the Severn Estuary. The SFRA 2 confirms that the majority of the study area is now in 2011, and will remain in 2111, within Flood Zones 3a and 3b (the functional flood plain).

12.9.2 Although this study is intended to focus on the period from the present to 2050, the pattern of development that is established between now and 2050 is likely to exist well beyond that period and, in flood risk terms, it is important to plan development taking into account the predicted changes in sea level over a longer period, notwithstanding that some development within the study area may have a shorter lifespan.

12.10 Fluvial Flood Risk

12.10.1 It is also important to note that significant parts of the study area are also at risk from fluvial flooding. The areas at risk of such flooding are shown on the plan at Appendix 18 as being within Flood Zone 3b (the functional flood plain).

12.11 Implications for the Study Area

12.11.1 Existing and planned development within much of the study area, including important infrastructure, is at an increasing risk of tidal flooding as a result of climate change. The existing flood defences within the study area will become increasingly inadequate to defend the area against the risk of tidal flooding in the period to 2111.

12.11.2 The existing tidal flood defences are in a number of different ownerships, of variable quality and height and comprise a mix of formal and informal (e.g. the existing railway line) structures. At present there is no formal regime in place for maintaining or improving the existing flood defences.

12.11.3 The Port is intending to develop its DSCT at a height of 10.67m OD and this will act as a flood defence in the south west corner of the study area. However, the Port is not, as part of its proposals to develop the DSCT, intending to replace the lock gates that will remain at a substantially lower level.

12.11.4 Although improvements to the flood defences, or the provision of a new flood defence, could be undertaken on a phased basis, the level of protection offered by the defences will only be as high as the lowest or weakest length of the defences.

12.12 Site by Site Mitigation

12.12.1 Within the study area, the approach to mitigating the increasing risk of flooding to new development has, to date, generally been addressed on a site by site basis with land raising taking place within individual development sites to mitigate the risk of tidal flooding. However, such an approach may, in the longer term, be unsustainable because, in the absence of other measures, it is likely to potentially increase the risk and depth of flooding to other development in the area.

12.12.2 Developers of land within the area of the 57/58 permissions have been raising land levels to mitigate the risk of tidal and fluvial flooding. South Gloucestershire Council is unable to exert any planning or other controls over the development, including the raising of land levels, within the area covered by those permissions.

12.12.3 The area covered by the 57/58 permissions is not yet fully developed. The continued raising of land is likely to increase the impact of flooding on other development within the study area. The SFRA 2 indicates that if the entire area covered by those permissions were developed with raised land levels, the depth of flooding across the remainder of the study area could increase by up to 0.3 metres.

12.12.4 However, land raising is also taking place outside the area covered by the 57/58 permissions with two substantial, recent developments (an energy from waste plant for SITA in the Severnside area and the development of a new distribution warehouse for the Co-op in Avonmouth) on previously developed land being granted planning permissions for new developments, subject to buildings and other important external areas being raised so that their finished floor levels will be at a lower risk of flooding in the future.

12.12.5 In the context of the findings in the SFRA 2, the ongoing raising of land levels across the study area is unlikely to be sustainable in the longer term because of the impact on potential flood levels elsewhere in the study area. However, there may still be a need to develop new buildings with elevated floor levels to mitigate the residual risks from flooding even with a strategic defence solution in place.

12.12.6 Both Councils' desire to realise the Vision in the study area means that it is necessary to consider whether additional land could be brought forward for economic development in the study area. It is therefore necessary to consider how additional development (on both previously developed and green field land) could be brought forward in the context of the fluvial and tidal flood risks in the area and the opportunity to develop a strategic solution to mitigate the risk of tidal flooding in the area.

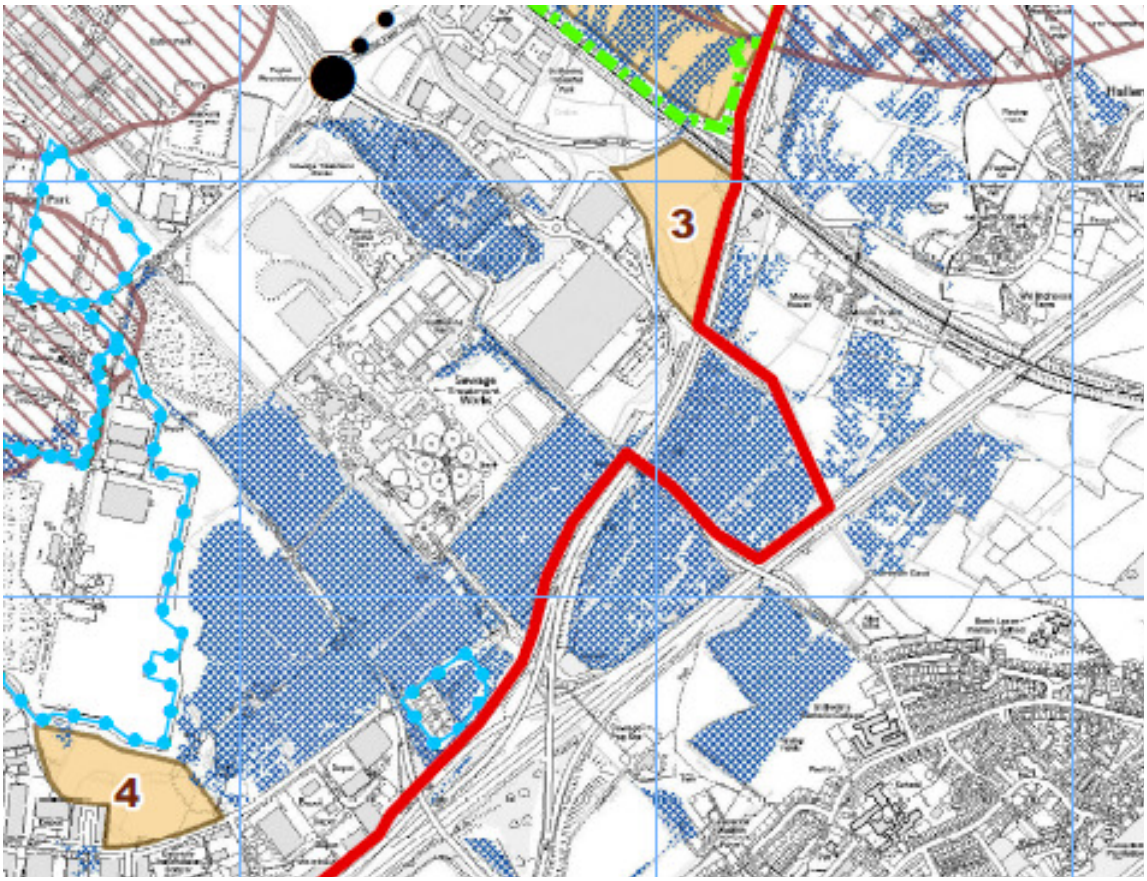
12.13 Functional Flood Plain – Flood Zone 3b

12.13.1 Some parts of the study area are within the functional flood plain (Flood Zone 3b). Development in such areas should be restricted to "water compatible development" and "essential infrastructure" (including essential transport infrastructure and utilities that need to be located in such areas) that does not adversely affect flood flows and mechanisms.

12.13.2 The extent of the land within Flood Zone 3b is shown in the plan at Appendix 18. The areas of functional flood plain include:

- a substantial area of green field land within the central undeveloped part of the study area;
- substantial parts of the undeveloped area covered by the 57/58 permission (illustrated in the photographs from the year 2000 that were included in the SFRA 2); and
- much of the green field land in the Avonmouth area in proximity to the M5/M49 junction.

12.13.3 Economic development within the functional floodplain would not normally be acceptable. We have therefore generally sought to exclude such areas from our assessment of the area's economic development potential. In particular, we have assumed that the green field land to the south of the railway line within the Avonmouth area that is part of the functional floodplain will not be suitable for economic development (see extract from the plan at Appendix 10 below that shows these areas cross hatched blue):



12.13.4 Furthermore, no studies have been undertaken to assess the implications of the 57/58 permissions being completed within the functional floodplain. There is a risk that the development of the 57/58 permissions will displace water elsewhere within the study area in the event of a fluvial flood. Further work will be required to assess the implications of the displacement of the functional floodplain and whether this could increase the risk of flooding elsewhere within the study area. Broad assessments of the implications of land raising are however available in the SFRA 2 for the Avonmouth/Severnside area.

12.13.5 However, much of the undeveloped, central part of the study area is at a similar level and has a relatively flat topography. Depending on the outcome of further work to assess the implications on fluvial flood risk of the development of the land covered by the 57/58 permissions, it may be possible to mitigate the risk of fluvial flooding in some areas by lowering land levels in neighbouring parts of the study area. We have assumed that this approach would, from a flood risk perspective, enable the development of some of the land within the central part of the study area.

12.14 Sequential Test

12.14.1 Outside Flood Zone 3b, the majority of the study area is within Flood Zone 3a. Even if the existing flood defences were increased in height to better protect the study area against the risk of tidal flooding, the areas that are currently within Flood Zone 3a would remain so because of the risk of a breach, even after the completion of those defences. In such areas, PPS 25 advocates a sequential approach to assessing flood risk.

12.14.2 PPS25 advises that decisions to allocate land in development plans and decisions on planning applications for industrial and warehouse development should pass the "*Sequential Test*" i.e. demonstrate that there are no other "*reasonably available*" sites for such development in areas with a lower risk of flooding.

12.14.3 The SFRA 2 will be the key tool that is used by the Councils to assess allocations for new development sites in the study area using the Sequential Test and (where necessary) Exception Test as required by PPS 25.

12.14.4 The Environment Agency has published guidance about the application of the Sequential Test (http://www.environment-agency.gov.uk/static/documents/Research/SequentialTestProcess.pdf) and the Practice Guide to PPS25 (http://www.communities.gov.uk/publications/planningandbuilding/pps25guideupdate) provides further guidance about its application.

12.14.5 The Sequential Test should be applied when allocating land for development in development plan documents. The Test is applied to demonstrate that there are no reasonably available sites in areas with a lower probability of flooding, which would be appropriate to that type of development.

12.14.6 If there is no other reasonably available site within the lowest risk zone (from all sources of flooding), then the vulnerability of the proposed development can be taken into account. Industrial and warehousing developments generally fall into the lower vulnerability classifications of land use that could, if they meet the "sequential test", be acceptable from a flood risk perspective in Flood Zone 3a.

Approach to the Sequential Test to Date

12.14.7 Development of the land covered by the 57/58 permissions has progressed without the need to address the Sequential Test. On sites that are not covered by these permissions, the Councils and Environment Agency have accepted that, to date, the development of large scale industrial and warehouse premises and waste processing facilities on sites allocated for such development meet the Sequential Test.

12.14.8 The Councils have also allocated (predominantly previously developed) sites for residual waste treatment facilities within the study area through the JWCS on the basis that there are no other suitable sites available that are at a lower risk of flooding within their areas, and that there is a reasonable prospect of developers of these facilities being able to demonstrate that the risk of them flooding can be addressed without materially increasing the risk of flooding elsewhere in the area.

Reasonably Available Sites at a Lower Risk of Flooding?

12.14.9 In considering whether there are any reasonably available sites at a lower risk of flooding, it is necessary to define a geographical area of search. The Environment Agency's guidance about the application of the Sequential Test notes that the area will usually be the whole of a local planning authority's area. It does however also note that the area could in some cases be reduced or increased (for example in the case of a new oil refinery where the area of search might include the whole country).

12.14.10 The PPS25 Good Practice Guidance notes that local planning authorities should consider undertaking such an assessment at a sub-regional level to broaden the scope for opportunities to

reduce flood risk and put the more vulnerable development in lower flood risk areas. It also acknowledges that development may be needed in Flood Zones 2 and 3 for sustainability reasons.

12.14.11 The Councils will, through the development plan process, consider the need to allocate additional land for industrial and warehousing development within their boundaries beyond the period covered by their Core Strategies to 2050. If the Councils are able to demonstrate that there is no other land at a lower risk of flooding that is suitable for such development to 2050, the land within the study area will have "passed" the Sequential Test.

12.14.12 Bristol City Council's area only has limited land within it and there are few opportunities to allocate additional land to accommodate further industrial and warehouse development. However, South Gloucestershire includes substantial areas of land outside Flood Zone 3a and in Flood Zones 1 and 2 that may be suitable for such development.

12.14.13 Within the context of this study, it is not however possible to demonstrate that, in general terms, industrial and warehousing development could not be allocated on land within each Council's area (or over a wider area) that is at a lower risk of flooding (i.e. in Flood Zones 1 and 2).

12.14.14 However, for the purposes of this study, we have assumed that there is no other land available in the "area" for general industrial and warehousing development that is at a lower risk of flooding (i.e. in Flood Zones 1 and 2).

12.14.15 In the event that other suitable land for industrial and warehouse development is available outside the study area within Flood Zones 1 or 2, the development of land for such purposes within the study area would fail the Sequential Test and would not accord with current planning policies about development and flood risk.

12.14.16 Although this applies to the general allocation of land for industrial and warehouse development, there may be a need for land to be allocated in proximity to the Port for related uses or because of the area's good links to the strategic road network. Furthermore, we have already acknowledged that the study area is of at least regional importance and that much new development has taken place within the area because of its specific location characteristics that include proximity to the motorway network and the Port. It is unlikely to be possible to identify land that is suitable for such development within an area that is at lower risk of flooding. The allocation of land for industrial and warehouse development that has specific location requirements that could only be satisfied by land within the study area could therefore "pass" the Sequential Test.

12.15 Exception Test

12.15.1 Industrial and warehousing development within the study area would be classed as "Less Vulnerable" and would not, if the Sequential Test were satisfied, normally need to address the Exception Test.

Breach Hazard Bandwidth and Exception Test

12.15.2 However, within the study area, the SFRA 2 identifies a "*breach hazard bandwidth*" where it is recommended that new development within the "less vulnerable" category (that includes industrial and warehousing and distribution development) should **also** pass the Exception Test.

12.15.3 Due to the potentially high flood hazard posed by a breach in the tidal flood defences in the area, the breach hazard bandwidth has been identified as an additional Flood Zone. This area is where

particularly high velocities and speed of inundation would be expected in the event of a breach in those defences. The area extends across a significant strip almost 2kms wide inland from the shoreline, encompassing a significant part of the study area (see plan at Appendix 20). It identifies the "residual risk" from flooding in the study area in the event that the existing flood defences (or future improved defences) were to fail.

12.15.4 The risk of the flood defences failing would also need to be addressed by the introduction of a comprehensive management plan that seeks to ensure the proper management and maintenance of all of the flood defences that protect the area.

12.15.5 The SFRA 2 recommends an extended Flood Zone 3a policy for the breach hazard bandwidth and a requirement for development to satisfy the Exception Test. It also recommends that FRA for development in this area should assess the risk of breach in more detail and consider mitigation measures, including building design. The development of new buildings within this area may therefore be more costly than for a "standard" building type.

12.15.6 The Exception Test seeks to ensure that new developments which are needed in medium or high flood risk areas only occur where the flood risk is outweighed by other sustainability factors and the development can be made safe for its lifetime, taking climate change into account.

12.15.7 The Exception Test is broadly that:

- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by an SFRA where one has been prepared;
- the development should be on developable previously-developed land or, if it is on green field land, that there are no reasonable alternative sites on developable previously-developed land; and
- a FRA must demonstrate that the development will be safe, without increasing flood risk elsewhere.

12.15.8 We have assumed that the SFRA 2 requirement for development within the "*breach hazard bandwidth*" to pass the Exception Test would remain, even following the development of a strategic flood risk solution. However, the risk of a breach could be reduced by the implementation of a robust management and maintenance regime.

12.15.9 It is therefore important to consider the possibility of development within the breach hazard bandwidth within the study area on the basis of the need to pass the Exception Test.

12.15.10 In this context:

- the development of land within the study area could provide wider sustainability benefits to the community by supporting economic development. The sustainability benefits of developing within this area would need to be set out in a Sustainability Appraisal;
- the development of green field land within the study area should only be brought forward after the development of previously developed land has been exhausted; and
- an FRA is able to demonstrate that the development of such land could be made safe and that it would not increase flood risk elsewhere.

12.15.11 The requirement to pass this Test would therefore exclude the possibility of industrial and warehouse development on green field sites within the study area, until such time as "developable previously developed" sites have been exhausted. In the context of the substantial areas of previously developed land within the study area, the development of further green field land within the breach hazard bandwidth area is unlikely to be justified at the present time, but may become justified as the supply of previously developed land available for development diminishes.

12.16 Flood Risk Assessments

12.16.1 Proposals for new development in the area will need to be accompanied by Flood Risk Assessments (FRA) that demonstrate that development itself could be safe and that it would not increase the risk of flooding elsewhere. It is likely that individual developments would still need to incorporate proposals for raised land areas to provide safe refuges and/or opportunities for the safe means of escape from such sites in the event of the flood risk materialising. Although further land raising would to some extent put existing properties at lower levels at increased risk, this approach is likely to be required to mitigate the risks of flooding within the breach hazard bandwidth area.

12.16.2 It will be important to ensure that raised areas, including means of escape, do not adversely affect flood flows across the area or exacerbate the risk of flooding to other areas.

12.16.3 The possible impacts of new or improved means of escape and transport infrastructure will need to be carefully considered and, if possible, mitigated through design (for example, through the provision of flood culverts or viaduct structures).

12.16.4 Where engineering or cost constraints are prohibitive, it may not be possible to provide a safe means of egress during a large tidal flood event. The effectiveness of flood warning and appropriate emergency plans, including refuge areas, will therefore be crucial.

12.17 Flood Risk Mitigation Options

12.17.1 The principal flood risk mitigation options are to:

- do nothing;
- implement strategic land raising across the study area on a site by site basis to ensure that development is above the predicted flood levels;
- implement a strategic flood defence by
  - raising the height of the existing defence along the study area's southern and eastern boundaries to 10.74m OD; or
  - raising the height of the existing defence along the study area's southern and eastern boundaries to 12.74m OD; or
  - developing a new flood defence to the east of the existing flood defence to 10.74m OD; or
  - developing a new flood defence to the east of the existing flood defence to 12.74m OD;

alongside measures to ensure that development is safe in the event of a breach, or, in the case of the 10.74m OD option, wave overtopping (for example, localised land raising). The levels of 10.74m and 12.74m AOD have been selected from the analysis in the SFRA 2.

Do Nothing

12.17.2 The SFRA 2 indicates that it is essential that a strategic flood defence solution is brought forward to protect existing development within the study area. The "do nothing" option is not therefore acceptable because existing development and infrastructure within the study area would become increasingly at risk of tidal flooding. This option would also preclude new development within the study area as it becomes subject to an increasing risk of flooding.

Strategic Land Raising

12.17.3 The SFRA 2 concludes that the strategic raising of land levels within the study area is likely to increase the risk and severity of flooding for others. This has been the approach of developers of green field and previously developed land to date, but the Environment Agency has stated (see Appendix 5) that:

As the Agency is the Councils' flood risk advisor, it will need to make a clear representation to both LPA's about the risks and implications of continuing a site specific approach. It must be understood that it is not a sustainable approach as the cumulative impact of land raising, as explained in the Phase 4 SFRA, has a detrimental impact due to a loss in overtopping storage volume, creating an increased risk in flooding to third parties. The risk of breach would also still be present. To summarise, this approach is unacceptable and contrary to government policy, as detailed in PPS25.

12.17.4 We have therefore assumed that, in general, a site specific approach to development on both green field and previously developed land within the study area will no longer be acceptable and that a strategic solution will be required to enable further economic development in the study area.

Implement a Strategic Flood Defence

12.17.5 The implementation of a strategic flood risk solution across the study area is the recommended way forward.

12.17.6 The SFRA 2 notes that the development of a new strategic flood defence to a height of 12.74m OD that would protect the area against overtopping from extreme tidal waves in the Severn Estuary would be prohibitively expensive (£200–300 million) and is unlikely to be acceptable on environmental grounds. This option is not therefore acceptable.

12.17.7 Although there may be some opportunities or requirements to develop parts of a strategic flood defence to the east of the existing defences, the development of an entirely new defence to the east of the existing been excluded from further analysis in this study because such an approach would:

- leave the railway infrastructure vulnerable to flooding;
- leave other development and infrastructure to the east of any such defence still vulnerable to flooding;
- have an impact on other drainage within the area; and
- require the demolition and removal of existing development and infrastructure.

12.17.8 The main option considered in this study is therefore the improvement of the existing flood defence (with potential new sections of defence being constructed in some areas) to a height of 10.74m OD. The SFRA 2 selected this level as an indicative design level solely for the flood defence assessment. It broadly represents a 1 in 200 year level of protection, taking into account climate change and

assuming a still tide level with a 0.5m "freeboard" (and excluding the unknown risks of wave overtopping and a breach in the defences).

12.17.9 Although there has been no specific assessment of the standard of protection (SoP) that this level would provide, we have assumed that this would represent a "Hold the Line" solution.

12.17.10 However, this solution would not eliminate all flood risk within the area. There would still be some risk from wave overtopping, larger tidal flood levels, breach, and fluvial flooding. In particular, the increased height of the defence would not affect the Environment Agency's designation of much of the study area within Flood Zones 3a (because the mapping assumes a possibility of a breach in the defences) and 3b and would not alter the breach hazard bandwidth identified in the SFRA 2. There would therefore still be a requirement for new development to 2050 to address the Sequential Test and the Exception Test where it fell within the area of the breach hazard bandwidth.

12.17.11 A more detailed assessment of residual risk associated with wave overtopping will be required and an assessment of the benefits of the flood defence solution will need to consider the reduction rather than the removal of residual flood risk. If the frequency and severity of flooding to the study area were reduced from what might otherwise occur due to climate change, it would improve the sustainability of existing development in the area and would also improve the sustainability of any additional development.

12.18 Costs

12.18.1 The SFRA 2 estimates the cost of raising the existing defences to a minimum level of 10.74m AOD as £56.8 million, including works to the Port's lock gates and tie in structures.

12.18.2 Buro Happold have also indicated in their study that a contingency sum of £3m should be included for works that may be required to mitigate fluvial flood risk within the study area.

12.19 Phasing

12.19.1 Although phasing of the flood defence work is possible and likely to be desirable given the multiple ownerships and nature of the different lengths of defence, the completion of improvements to the entire flood defence is necessary to "hold the line" whilst keeping pace with climate change.

12.19.2 Indeed, the Environment Agency note in their letter of the 22nd March 2011 (Appendix 5) that:

Flood protection would need to be provided for the whole tidal cell rather than just partial improvements. … a strategic flood risk management approach is required to enable new development. The preferred approach is to improve the tidal defences.

12.19.3 A phased approach to raising some of parts of the defences to keep pace with climate change may be possible, The Environment Agency has commented that:

"It is doubtful whether the length of defence could be delivered in a phased manner, on the grounds that it would still get flanked from low spots. However, it may be possible to provide the final design height in a phased approach, thereby ensuring the provision of an appropriate defence when it is actually needed. Detailed design would need to investigate the phased approach, particularly in respect of the inherent costing implications.

12.19.4 It is likely that a phased approach to the development of the defences would be significantly more expensive and in the case of some areas (including the railway line), it is unlikely to be feasible.

Instead, each section will need to be raised to the required height of 10.74m OD in a single operation.

12.19.5 In the context of the requirement to undertake further work to, inter alia:

- assess the implications of maintaining and raising the flood defences on the SPA tidal habitat to the west of the flood defences;
- assess the proposals under EIA and the Habitat Regulations;
- assess the condition and method of construction of the existing defences;
- prepared detailed designs for the proposed works; and
- procure the works;

it is likely to take a minimum of 5 to 10 years to bring forward a comprehensive flood risk solution (i.e. 2016 to 2021).

12.19.6 Planning policy in respect of the development of green field land within the study area is unlikely to support such development until it has been established that a comprehensive flood risk solution is likely to come forward.

12.20 Risks

12.20.1 The risks associated with the area's potential for tidal and fluvial flooding are significant.

Risks	**Mitigation**
Maintenance/raising of the existing flood defences results in a loss of habitat that must be mitigated elsewhere.	Seek technical advice about the impact of climate change on the SPA in the event that flood defences are maintained at, or raised above, their existing height.
Landowners are unwilling to co-operate to develop a comprehensive flood risk solution.	Consider CPO powers and alternative comprehensive flood risk solutions.
Existing flood defences are incapable of improvement.	Consider options to replace existing flood defences or develop new flood defence inland.
Condition of flood defences is worse than anticipated and more urgent works are required to maintain/raise the defences.	Undertake more detailed condition surveys of the defences.
Assumptions underlying cost estimate vary resulting in variation in cost.	Seek to verify cost assumptions, particularly costs of improving the railway line.
Options for flood mitigation have a significant harmful impact on the SPA.	Consider alternative options for design and siting of flood defences.
Flood risk mitigation measures do not provide	

adequate protection to bring forward the development of land for development.	
Investors/developers take an increasingly risk averse view to development within the study area.	Ensure proposals for bringing forward land comprehensive flood risk solution are pursued.
Bristol Port delays/abandons its proposals for a DSTC.	Consider alternative flood defence options in the vicinity of the Port.
Fluvial flooding is exacerbated by the development of the 57/58 permission.	Undertake technical work to assess impact of development of 57/58 permission on fluvial flood risk in the area.
Fluvial flood risk can not be mitigated.	Exclude areas in Flood Zone 3b from further consideration for development.
Fluvial flood risk mitigation is too costly.	Undertake detailed analysis of fluvial flood risk mitigation.
Fluvial flood risk mitigation is incompatible with ongoing agricultural use of the land.	Consider cost of acquiring and subsequent management of land for flood risk mitigation.
Land owners are unwilling to make land available for fluvial flood risk mitigation.	Consider a range of alternative sites for flood risk mitigation.
Surface water drainage is adversely affected by climate change.	Assess whether modelling has been undertaken to assess impacts of climate change on surface water drainage.
Surface water drainage is adversely affected by flood defence improvements.	Ensure that preparation of detailed flood defence proposals take account of surface water drainage requirements.

12.21 Conclusions

12.21.1 There is a need to protect existing development within the study area from the risk of tidal flooding in particular. The existing tidal flood defences were not developed as formal defences, they are in multiple ownerships and there is no formal regime in place for their ongoing maintenance. Furthermore, the existing defences will provide a reduced level of protection over time as a result of climate change and increasing sea levels.

12.21.2 It is therefore important to improve the existing defences to protect existing development within the study area, and to formalise the responsibilities and maintenance regime for the defences. Indeed, the SFRA 2 Summary Report (http://www.bristol.gov.uk/sites/default/files/assets/documents/Avonmouth_SummaryReport_Phase4_Final_v3b.pdf) states at paragraph 9.52:

Improvements to defences are considered essential for the Avonmouth/Severnside area to remain viable in the future given the scale of future flooding expected due to climate change.

12.21.3 Furthermore, the improvement of the existing flood defences is essential to achieving the area's full economic development potential by enabling additional land for development to be brought forward. In the absence of any improvements to the area's flood defences, it is unlikely to be acceptable to bring forward further green field land for economic development. Furthermore, it is unlikely to be acceptable to continue to bring forward previously developed land for economic development in the absence of a strategic solution because mitigation on a siet by site basis is likely to unacceptably increase the risk of flooding to others.

12.21.4 The SFRA 2 suggests a solution for improving the flood defences within the study area is to increase the height of the existing defences to 10.74m AOD at an estimated cost of £56.8m. This will not mitigate all risks of flooding and technical studies will be required to establish the residual risks. Site specific measures, including localised land raising, may be required to mitigate the residual risks.

12.21.5 More detailed technical studies are required to establish the feasibility of improving the coastal flood defences to the 10.74m AOD level. It will be necessary to model the impact of the flood defence options to properly assess their potential benefits. This work would need to be undertaken using the same modelling that has been used to inform the SFRA 2 to ensure consistency.

12.21.6 If additional green field development is to be accommodated within the central part of the study area, Core Strategy planning policies will need to be reviewed in the context of the recommendations of the SFRA 2 and will need to address the Sequential and Exception Tests.

13.0 District Heating

13.1.1 District heating is a system whereby heat is produced in a central location (for example "waste" heat from power stations or waste processing facilities) and is then transferred to buildings in the form of hot water. The heat transported in the water can be used to both heat and cool buildings.

13.1.2 A separate report about the study area's potential for district heating is attached at Appendix 7. The Project Brief requires that we, in broad terms, establish if the development of a district heat or power distribution network is feasible and, if so, how this could/should be taken forward?

13.1.3 The development of district heating in this area needs to be seen in the context of the government's aspiration for new non domestic buildings to reduce their energy requirements and be "zero carbon" by 2019. It also needs to be viewed in the context that new and existing development in the area principally comprises B1 (light industrial), B2 and B8 uses with some sui generis uses.

13.1.4 The development of district heating is likely to be most viable in new development where it will not need to compete with the low cost of existing heating networks that are already in the ground i.e. it is likely to be most viable in areas where new development is planned.

13.1.5 Both Councils have prepared separate studies about the opportunities for renewable energy generation within their areas to support their Core Strategies.

Potential for Renewable and Low Carbon Energy in South Gloucestershire

13.1.6 South Gloucestershire Council published a report in June 2010: Potential for Renewable and Low Carbon Energy in South Gloucestershire (http://www.southglos.gov.uk/NR/rdonlyres/3098A0D8-AEA9-4F09-B443-2860D98652DB/0/PTE100124.pdf). The report suggests that the:

"*greatest strategic opportunity for carbon reduction is the potential for a district heat network to supply heat from Severnside ERC and/or Rolls Royce to significant new development in the UWE / Harry Stoke and Cribbs/Patchway areas and potentially serving a wider catchment of existing buildings.*"

However, a feasibility study about linking the Severnside area to strategic growth areas outside the study area is outside the scope of this study.

Bristol Citywide Sustainable Energy Strategy

13.1.7 Bristol City Council published a report in June 2009: Bristol Citywide Sustainable Energy Strategy (http://www.bristol.gov.uk/sites/default/files/documents/planning_and_building_regulations/planning_policy/local_development_framework/Bristol%20Sustainable%20Energy%20Study%20-%20Final%20Report%20%28rev1%5B1%5D.1%29%20-%20CSE%2020090611.pdf). It analysed existing heat loads in Bristol alongside those expected from new development to identify Heat Priority Areas where conditions are likely to favour larger scale, economic and effective forms of sustainable energy generation such as district heating. The study area is not identified as a Heat Priority Area as the density of heat demand in the area is relatively low.

13.1.8 Bristol City Council's report also notes that it is unlikely that a connection from Avonmouth to City Centre heat loads would be economic in the short term, although this could emerge in the longer term as a citywide heat network develops.

Buro Happold Study

13.1.9 The Buro Happold study at Appendix 7 notes that there are a number of generators of heat within the study area that provide an opportunity to develop a district heating system or series of systems in the study area.

13.1.10 The study is the subject of a number of important assumptions, including about the mix and density of development and presents a best case scenario for the feasibility of the district heating network.

13.1.11 In particular, the study assumes that **all** new development on green field land within the area will require space heating (in contrast to existing development in the area where only about 50% of buildings have such heating).

13.1.12 Furthermore, it is likely that much of the existing building stock within the study area is heated by radiant space heating that would need to be replaced by new heating systems that are capable of taking advantage of district heating systems. It is not known whether it would be viable to replace existing heating systems within the building stock to facilitate district heating. The costs in the study exclude the costs associated with upgrading heating systems within existing buildings to facilitate the use of district heating.

13.1.13 The study identifies that there is a significant number of generators of heat within the study area that could be used in a district heating system. Although there is the potential to generate electricity (via, for example, wind and solar technologies) to distribute beyond the study area, the study concludes that a local heat distribution network powered mostly with biomass and energy from waste Combined Heat and Power (CHP) plants offers the best renewable energy opportunity for the Avonmouth Severnside area because it will maximise the environmental benefits of the low carbon/renewable energy generated in the area.

13.1.14 Much of the existing development in the study area is focused in the south (Avonmouth), but substantial additional development is anticipated in the Severnside area in the north in the future under the terms of the 57/58 permissions.

13.1.15 The study concludes that the best opportunity for developing a district heating system is within the green field land covered by the 57/58 permissions where the density of development is unlikely to be constrained. On the additional green field land with economic development potential, we have assumed that the density of development will be lower and this adversely affects its viability for development with a district heating system.

13.1.16 The evidence identifies some potential anchor loads in the study area that could benefit from a district heating system and the study suggests that further investigations be undertaken to initiate the development of a district heating network in the southern part of the study are and that consideration be given to subsequently expanding this to the northern part of the study area.

13.1.17 The study concludes overall that, based on a number of assumptions about the mix of development, installing a district heating network to serve new developments in the area covered by the 57/58 planning permission in the north of the study area could be economically feasible and could assist the feasibility of installing a network supplying existing developments within the study area, which otherwise will be borderline.

13.1.18 The development of a district heating network is not essential for realising the area's economic development opportunity, but could help to attract businesses with a high energy demand into the

area. In the longer term, if such a system were viable, there is potential to link it to Bristol's Heat Priority Areas.

13.1.19 The study does however include a number of important assumptions that will require further testing and presents a "best case" scenario that will need to be refined and validated with additional information and sensitivity analyses. In the event that a detailed analysis shows that the development of a district heating system is viable, it is likely to require the establishment of an Energy Services Company to fund the development and management of the network.

13.1.20 The study includes a number of recommendations for taking forward further investigations about the potential to establish a district heating system in the area. In particular, it recommends that the installation of a district heating system would, if further detailed work supports its viability, need to be promoted by an Energy Services Company.

14.0 Development Potential

14.1 Land Use

14.1.1 Although the Councils' vision seeks to encourage "*green and environmental technologies*" into the area, from a land use planning perspective, our study assumes that the area's future development will comprise a mix of B1/B2 (industrial), B8 (storage and distribution) and sui generis land uses. We anticipate that "*green and environmental technologies*" will fall within the B1/B2 (industrial) use class or will comprise sui generis uses.

14.2 Mix of Uses

14.2.1 Development plan policies for the study area generally seek to restrict B1 office and residential uses because of the potential transport implications and compatibility of such uses with existing uses in the study area. Development plan policies generally only support B2, B8 and some sui generis uses (including, for example, waste processing) within the study area.

14.2.2 For the purposes of our study, we have assumed that development plan policies will continue to restrict B1 office and residential uses within the study area up to 2050 and that any new development will predominantly fall within the use classes B2 and B8, or that it will comprise sui generis uses. This is likely to be the case for the area covered by the extant 57/58 planning permissions.

14.2.3 However, we anticipate that there is likely to be some limited potential to develop ancillary facilities to serve the needs of employees within and visitors to the area, including convenience food sales, catering and hotel uses. Any such uses are however unlikely to make up a substantial or material proportion of the overall quantum of development in the area between now and 2050 and would need to address the sequential and exception tests in respect of flood risk.

14.3 Employment Density

B2 and B8 Uses

14.3.1 The project brief requires that we use English Partnerships employment density guidance. However, that guidance was superseded in January 2011 by the publication by the Homes and Communities Agency (HCA) of the Employment Densities Guide 2010 (2nd Edition):

http://www.homesandcommunities.co.uk/employment-densities-guide-2nd-ed

14.3.2 Our study uses the figures for the Table of Employment Densities in section 3 and has been prepared on the basis of 1 FTE per 36 square metres of Gross External Floor Area (GEA) for B2 and 1 FTE per 80 square metres of GEA for B8 (large scale and high bay) development.

14.3.3 However, the employment density figures must be treated with some caution and only used as a very broad guide because the Table notes that the range of employment density is between 1 FTE per 18 to 60 square metres of GEA for B2 uses and that "*wide variations exist arising from scale and storage duration*" for B8 uses.

14.3.4 The notes in section 4.0 of the Guidance highlight some of the factors that can lead to variation in the employment density, including that smaller buildings generally have higher employment densities than larger buildings. The Guidance therefore recommends sensitivity testing in respect of the employment densities.

14.3.5 Within the study area, it is also worth noting that there are substantial open storage areas (including for cars and other vehicles). The Guidance provides no indication of the employment potential of such open storage areas, but it is likely to be significantly lower than sites of a similar size that are occupied by buildings within B8 use. The future expansion of the Port may require that more land is made available for open storage purposes for containers or other products that are imported/ exported via that facility.

Sui Generis Uses

14.3.6 The study area is also occupied by a number of sui generis uses that include, for example, waste processing and open storage uses. It is anticipated that further growth in sui generis uses will need to be accommodated within the study area. However, there is no guidance about the employment density of such development.

14.3.7 We have therefore examined the proposals for a sui generis development on land at Avonmouth that is to be developed by Viridor as a Resource Recovery Centre. This is a substantial facility on a 8.3ha site with buildings with a floor area of about 28,000 square metres, but it will incorporate substantial areas of waste processing and storage and will only provide 70 FTE jobs. The employment density of this sui generis development is therefore 1 job per 400 square metres.

14.3.8 Another sui generis use by SITA for an energy from waste plant of about 14,500 square metres on a 10.2ha site of south of Severnside Works on Severnside Road would employ about 46 people and would therefore have an employment density of 1 job per 315 square metres of floorspace.

14.3.9 There are a number of other comparable facilities that occupy substantial sites within the study area but that provide relatively low levels of employment, including other waste treatment facilities, a power station and LNG storage facility.

14.3.10 On the basis of the above analysis, we have assumed that sui generis uses will have an employment density of 1 FTE job per 250 square metres (although this is a higher density than in the specific examples above).

14.4 Development Density

14.4.1 We have made a number of assumptions in assessing the potential density of development on development sites in the study area. These are outlined in the following sections.

14.4.2 The density of development of different sites within the study area is used to inform our estimates of employment that might be generated from different uses and to therefore inform analysis of the area's economic development potential.

Central Park

14.4.3 We have initially analysed the development of the Central Park proposals (see Appendix 17) within the area covered by the 57/58 permission and noted that the individual development plots occupy about 85% of the overall development site. About 15% of the overall site area is used to accommodate access roads, drainage channels etc. We have used the same figures in our analysis.

14.4.4 Within each plot, the density of development in the Central Park proposals is about 35%, although it is slightly higher on some other sites within the area covered by the 57/58 permission. We have therefore used this figure to calculate the density of development that might come forward on any additional green field land within the area covered by the 57/58 permissions.

14.4.5 We have calculated the density of development of sites within the study area as a measure of the footprint of a building in relation to the overall area of a site (including, for example, parking, access roads, landscaping and surface water measures). Density is then expressed as the percentage of the site covered by the footprint of buildings.

14.4.6 Our measure of the density of development assumes that buildings are single storey, broadly following the recent pattern of development in the area.

Previously Developed Land

14.4.7 We examined the density of development of a number of recent proposals for the redevelopment of previously developed land within the study area. The density of development of such sites is in the region of 37.5%. We have assumed that the redevelopment of other previously developed sites will be undertaken at a similar density.

Green Field Land

14.4.8 Our assumptions about the density of development vary between those green field sites within the area covered by the 57/58 permissions and those outside that area.

14.4.9 Within the area covered by the 57/58 permissions, development is proceeding in a manner that is not unduly constrained by the area's ecology or risk of flooding. We have examined the density of recent development within that area, and also the planned density of development illustrated in the Central Park marketing brochure at Appendix 17.

14.4.10 Our analysis concludes that the area is being developed with large scale premises on large sites and that the density of development in the recently completed and planned Central Park developments is approximately 35%. We have assumed that development within the area covered by the 57/58 permissions will continue at a similar density.

14.4.11 On other areas of green field land we have assumed that development will be at a lower density than within the area covered by the 57/58 permissions to reflect the need to:

- retain important existing site features (including drainage channels, hedges);
- incorporate GI corridors;
- provide some on site ecological mitigation and flood risk mitigation measures; and
- Include some sui generis uses that are typically of a lower density than B2 and B8 uses.

14.4.12 We have assumed that a further 5% of each site will need to be set aside for such measures and that the overall site density will therefore be 30% on green field sites outside the area covered by the 57/58 permissions.

14.5 Development Rate

Past Development Rate – 2000 to 2010

14.5.1 The plan at Appendix 21 illustrates the extent of new development within the study area over the last 10 years. The plan differentiates between development that has taken place on previously developed land and that which has taken place on green field land. It has been prepared using a variety of evidence including the area's planning history, aerial photographic images and site visits.

14.5.2 Whilst development rates are extremely variable over time and difficult to project, our analysis indicates that the extent of development (by overall site area) within the study area over the last 10 years has been in the region of 160ha. This equates to a development rate of about 16ha of land per annum.

Development 2000 to 2010	Approximate Area
Green field land	120ha
Previously developed land	39.6ha
Total	**159.6ha**

14.5.3 Our analysis differs from that undertaken by the West of England Partnership (see report of 18th March 2010 to their Planning, Housing and Communities Board at: http://www.bristol.gov.uk/sites/default/files/assets/documents/1690%20BPAA%20Issue%203%20appendix.pdf) that examined the period 1989 to 2009 and concluded that:

Some 280ha of industrial development was undertaken between 1989 and 2009 at Avonmouth, Severnside and Royal Portbury. This represents about 60% of the total arising across the wider Bristol area over these years.

14.5.4 However, that analysis suggests a development rate of 18 ha per annum between 2001 and 2009, but it included land within the Royal Portbury area. The annual development rate in our study is therefore comparable to that in the West of England study.

14.5.5 South Gloucestershire Council's Employment Land Survey of April 2011 (http://www.southglos.gov.uk/NR/rdonlyres/251DEC40-CF74-4CCF-AB82-944E0E1BEFF9/0/PTE110214.pdf) states that only 744 square metres of additional floor space was created in the Severnside area within South Gloucestershire between 2010 and 2011. However, in the 5 year period from 2006 to 2011, there was a net gain of 95,885 square metres of floor area in the area (equivalent to 19,177 square metres per annum). At a density of about 35%, this would equate to about 27.5ha (equivalent to 5.5ha per annum).

14.5.6 Bristol's Business Development Survey Report (http://www.bristol.gov.uk/sites/default/files/documents/council_and_democracy/statistics_and_census_information/Business%20Development%20Survey%202011_0.pdf) notes a net loss of industrial and warehousing floorspace between 2010 and 2011, but notes that there were extant planning permissions for more than 200,000 square metres of such development outstanding within the area and that since April 2006, there has been a net gain of almost 50 ha of industrial and warehousing land in Avonmouth.

14.5.7 The combined area of new industrial and warehousing development in Bristol and South Gloucestershire between 2006 and 2011 is therefore about 77.5ha. This broadly correlates with the 160ha identified in our analysis from 2000 to 2010.

14.5.8 The past rate of development over the last 10 years provides an indication of the rate of development that might be expected within the study area in the future. We have based our

assumptions about the future rate of development in the study area on this past rate of development. Our assumptions about the future rate of development in the study area are set out in the separate report: Avonmouth Severnside Outline Development Strategy.

14.6 Assumptions about Development of the 57/58 Permissions

14.6.1 The plan at Appendix 10 illustrates the the remaining green field areas covered by the 57/58 permissions. About 350 ha of green field land remains available for development under the 57/58 permissions.

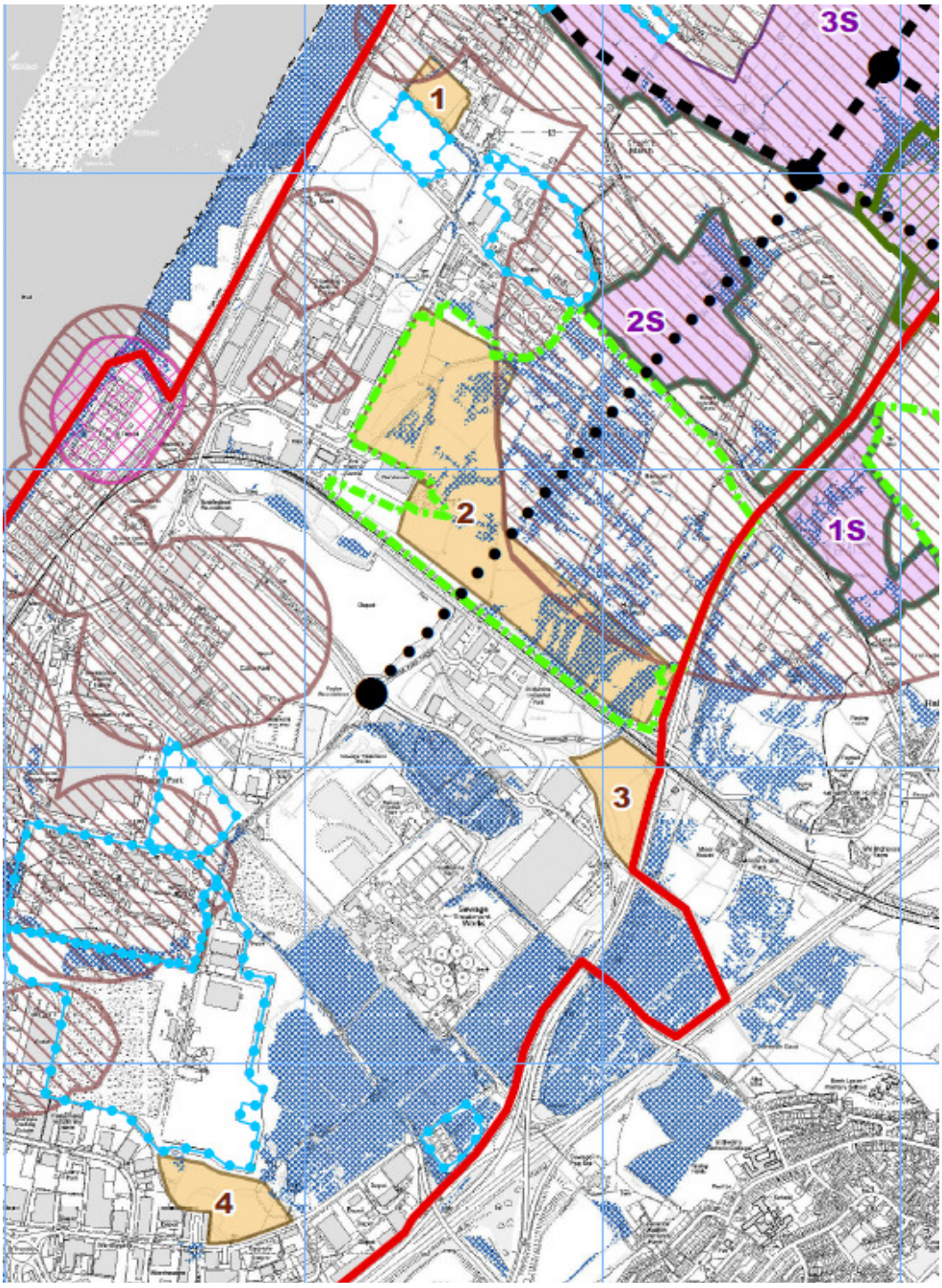
14.6.2 We have used the density of the planed Central Park development (i.e. 35%) to inform an analysis of the likely employment to be generated within the area covered by these permissions.

14.6.3 We have also cross referenced our analysis of the proposals for that area with the recent proposals by Astra Zeneca to develop about 32ha of part green field and part previously developed land with up to about 120,000 square metres of floor space (planning permission ref. PT10/02630/O) in area on the plan at Appendix 10. The proposed density of development in that scheme is about 37.5% which is slightly higher than the assumption that we have used because it includes some previously developed land.

14.6.4 However, it should also be noted that some sites covered by the 57/58 permission have been developed with B2 uses (including GKN and Warburtons). If further B2 uses come forward within the area covered by the 57/58 permission, this would increase the employment density and potential of the area.

14.7 Green Field Land Available for Development

14.7.1 Our analysis of the constraints within the study area identified a number of areas of green field land outside the area covered by the 57/58 permissions that could potentially be brought forward for development and these are shown on the plan at Appendix 10 and in the extract below:



Extract from Plan at Appendix 10 Showing Additional Green Field Land with Economic Development Potential

14.7.2 The areas of green field land are identified in five separate parcels: 1, 2, 3, and 4. These areas are in addition to the 57/58 permissions that includes about 350 ha of green field land .

14.7.3 We concluded that:

- site 1 could provide about 3ha of green field development. It is to the north of an existing developed site that is allocated for residual waste treatment;
- site 2 could provide about 46ha of green field development. It comprises a substantial part of an area known as Crooks Marsh Farm. The area is outside any COMAH Inner Consultation Zones, but its development will be constrained along its south west boundary with the adjacent railway line by the presence of underground pipes;
- site 3 could provide about 7ha of green field development. It incorporates a pond that may be of ecological importance and that may need to be retained, but it is otherwise surrounded by development including the existing railway line and M49; and
- site 4 could provide about 7ha of green field development. It is adjacent to a substantial spoil heap and may be ccontaminated. It has an existing road frontage from where access could be provided. The adjacent land to the north east is within the functional flood plain.

14.7.4 Other areas of green field land within the study area are the subject of constraints that limit their economic development potential. The constraints include the functional floodplain (Flood Zone 3b – see the plan at Appendix 18) and the COMAH Inner Consultation Zones (see the plans at Appendix 11).

14.7.5 On all of the additional green field sites with economic development potential, we have assumed a density of development of 30% to allow for on site ecological enhancements and surface water management and the retention of some existing landscape features. This is below the density of development of about 35% that is currently taking place within the area of the 57/58 permissions.

14.7.6 We have also assumed that the specific development mix within these sites could be dictated by planning policies (unlike the development of the land covered by the 57/58 permissions and the redevelopment of previously developed land over which there is little opportunity to control the precise mix of uses). We have assumed that the mix of development on these sites would be skewed towards a greater proportion of B2 than B8 uses to reflect the Vision for the area in the Project Brief.

14.7.7 In addition, site 4 is owned by Bristol City Council and we have therefore assumed that, as land owner, the Council will be able to dictate the mix of development on the site.

14.7.8 An analysis of the development potential of the green field land within the area covered by the 57/58 permission, the additional green field land identified in this study and previously developed land within the study area is set out in the separate report: Avonmouth/Severnside – Outline Development Strategy.

14.7.9 Our identification of the additional green field land with economic development potential assumes that each site would pass both the Sequential and Exception Tests in PPS25. In the event that proposals only passed the Sequential (and not the Exception) Test, the area of land that could be developed (and consequently the number of new jobs that could be accommodated) would be reduced.

14.7.10 In particular, if the area of site 2 within the breach hazard bandwidth could not be developed, it would reduce the extent of that site by about two thirds and would make the remaining land difficult and/or more expensive to access. It would also eliminate the possibility of development on site 1.

14.7.11 If development of the additional green field sites was not taken forward within the breach hazard bandwidth it would decrease the potential new jobs that could be accommodated within the additional green field land that we have identified by more than 50%.

14.7.12 If additional green field land is brought forward for economic development, a similar area of land will be required to provide ecological mitigation. The land for ecological mitigation identified in the Cresswell study would however be sufficient to compensate for the development of of the additional green field land identified for economic development in this study. About 60 ha of additional land would be required for ecological mitigation at an estimated cost of:

Item	**Calculation**	**Cost**
Land Acquisition/Agreement Cost	60 x £12.5k	£0.75 million
Works Cost	60 x £20k	£1.20 million
Total Cost		**£1.95 million**

14.7.13 In the context of the limited amount of additional green field land available for development beyond that identified in the 57/58 permission, we have identified this as the "optimum" option for realising the area's full potential for economic development.

14.8 Conclusions

14.8.1 The evidence about past development rates and the density and mix of economic development in the study area will be used to inform an analysis of the economic development potential of additional green field and previously developed land within the study area.

14.8.2 The development of the remaining green field land covered by the 57/58 permissions and the development of the additional green field land identified within this study area could provide about 412ha of economic development. The extent of this land is shown on the plan at Appendix 10 that also highlights the potential ecological mitigation areas identified in the separate study by Cresswell.

14.8.3 The separate Avonmouth Severnside Outline Development Strategy examines the potential for this green field land and previously developed land to provide sites for additional employment within the study area to help the Councils realise their vision for the area. It uses the evidence from this report to inform its conclusions.

15.0 Funding

15.1.1 Options for funding the infrastructure and mitigation identified in this report are dealt with in the separate report: Avonmouth Severnside Outline Development Strategy. The Project Brief specifically requires that we examine the extent to which infrastructure that might be required in the area could be funded via:

- s106 obligations;
- Community Infrastructure Levy (CIL);
- Accelerated Development Zone and Tax Increment Funding (TIF); or
- "other tariff mechanisms".

15.1.2 These matters are dealt with in more detail in the separate report, but it is appropriate that the potential for funding via s106 obligations and CIL are included in this report because they are closely related to planning policy matters.

15.2 S106 Obligations

15.2.1 In considering development proposals within the study area, the Councils are currently able to seek s106 obligations to mitigate the impacts of development. However, any such contributions can only be used to mitigate the impacts of the new development being proposed, rather than address existing problems.

15.2.2 S106 contributions can no longer be pooled across the study area to fund infrastructure. The focus of such obligations should now be on mitigating the site specific impacts of development proposed. Where funding needs to be pooled from development across the study area, the Councils will now need to consider the use of CIL, rather than s106 obligations.

15.2.3 S106 obligations will however continue to be suitable for seeking to mitigate the site specific impacts of development, such as site specific transport improvements.

15.3 Community Infrastructure Levy (CIL)

15.3.1 It is anticipated that CIL will be used to provide the infrastructure required to support the development of an area. This mechanism could therefore be used to raise funds to develop infrastructure within the study area. However, Bristol's current consultation about its draft CIL charging schedule suggests that economic development within the study area will not be liable for CIL.

15.3.2 Furthermore, CIL will not in any event apply to extant planning permissions and could not therefore be raised from the development of the land within the area covered by the 57/58 permissions.

15.3.3 It is however possible for the Councils to consider the priority for the spending of CIL generated elsewhere within their areas on infrastructure within the study area. CIL funding generated outside the study area could be pooled and used to fund infrastructure within the study area.

15.3.4 Therefore, although there is unlikely to be potential to generate CIL from economic development within the study area, there is potential for the Councils to allocate CIL collected elsewhere to fund infrastructure within the study area (Bristol's current consultation suggests that it anticipates that development in the Council's area will generate about £4 million per annum from year 4 onwards).

15.4 Conclusions

15.4.1 There will only be limited opportunities to secure funding for infrastructure in the area via s106 obligations and there will be little opportunity to generate CIL from development within the study area. The Councils will need to consider whether to allocate CIL collected elsewhere within their areas towards infrastructure within the study area.

16.0 Conclusions

16.1.1 This study has identified that the study area has significant economic development potential. However, that potential is unlikely to be realised in a sustainable manner unless the supporting infrastructure is brought forward together with the mitigation that is required to address the impacts of that development.

16.1.2 The study identifies the potential scale of development that is feasible with current and future constraints. The potential includes the economic development of previously developed land, about 350ha of green field land that has yet to be developed under the 57/58 permissions and an additional area of about 60 ha of greenfield land elsewhere within the study area.

16.1.3 The infrastructure that is required to protect existing development and infrastructure in the area and to facilitate further economic development and infrastructure includes a strategic flood defence, transport infrastructure (principally a new M49 junction) and ecological mitigation measures. The study estimates that the cost of this infrastructure is likely to be in the region of £110m.

16.1.4 The plan at Appendix 10 illustrates the areas where infrastructure and mitigation will be required to facilitate the area's economic development to help realise the Councils' vision. The plan does not include proposals for the location of a strategic flood defence, but the SFRA 2 suggests and the Environment Agency supports proposals for the improvement of the existing defences, with the development of some additional defences in the event that it is not possible to improve the existing defences,

16.1.5 The study indicates that if the funding is available to provide the infrastructure and mitigation that is required to facilitate the area's economic development, the Councils' shared Vision for the area is capable of being realised.

16.1.6 The separate report Avonmouth/Severnside Outline Development Strategy considers the options for realising the opportunity for the area's economic development and proposes an Outline Development Strategy. It assesses the costs, benefits and value for money of the proposed Outline Development Strategy and identifies one way in which it could be implemented.

16.1.7 Further detailed work will be required to explore the infrastructure and mitigation options available to bring forward the area's economic development to realise the Councils' shared Vision in a sustainable manner.

16.1.8 Finally, there is an opportunity to realise a district heating system within the study area, but this is only likely to be feasible in the event that there is demand for heat within the study area from both new and existing development.

Appendices