



Strategic Environmental
Assessment (SEA) of
the Glasgow 2014
Commonwealth Games
Strategy and Framework
November 2010

Table of Contents

1. Environmental Report Part B structure	1
2. SEA approach	2
2.1 Overview of approach	2
2.2 Scoping the SEA	3
2.2.1 Approach to scoping	3
2.2.2 Key scoping tasks undertaken	3
2.2.3 Taking account of responses to the scoping consultation	4
2.3 Stakeholder consultation and engagement	5
2.4 Collation of environmental baseline information	7
2.4.1 Description of the environmental baseline	7
2.4.2 Establishing the environmental baseline	8
2.4.3 Mapping of strategic sensitivities and opportunities	9
2.5 Introduction to the assessment of effects	10
2.6 Commonwealth Games Strategic Framework – assessment approach	14
2.6.1 Environmental commentary on the CG Strategic Framework	14
2.6.2 Compatibility analysis of CG Strategic Framework objectives and SEA objectives	14
2.7 Pre-games provisions – assessment approach	15
2.7.1 Causal chain and spatial analysis of individual projects	16
2.7.2 Detailed assessment of pre-games development programmes	17
2.7.3 Cumulative Effects Assessment (CEA) of pre-games development programmes	19
2.7.4 Development of pre-games mitigation and enhancement strategy	20
2.8 Games-time provisions – assessment approach	21
2.8.1 Assessment of traffic management measures	22
2.8.2 Assessment of the Games Route Network	23
2.8.3 Assessment of the Transport Strategic Plan’s spectator and Games workforce provisions	24
2.9 Development of measures to monitor significant environmental effects	24
3. Relationship with other plans, programmes, strategies and environmental protection objectives	26
3.1.1 Purpose of review	26
3.1.2 Key implications for the CG Strategy and Framework and SEA	26
4. West cluster, environmental objectives, baseline and context	32
4.1 Introduction	32
4.2 People, health and access	33
4.2.1 Demographics	33
4.2.2 Health and the environmental determinants of health	34
4.2.3 Access	39
4.3 Wildlife conservation & ecosystem services	40
4.3.1 Statutory and non-statutory conservation designations	40
4.3.2 LBAP Habitats and species	43
4.3.3 Green network	44
4.4 Water bodies & flooding	47
4.4.1 Local plans, policies and strategies	47
4.4.2 Water quality	47
4.4.3 Water pollution	49
4.4.4 Flood risk	49
4.4.5 Hydromorphology	49
4.5 Air quality, noise & dust	50

4.5.1	<i>Air quality</i>	50
4.5.2	<i>Air pollution</i>	51
4.5.3	<i>Noise</i>	52
4.6	<i>Soils & soil quality</i>	53
4.7	<i>Climate change issues</i>	53
4.7.1	<i>Flood risk provisions</i>	53
4.7.2	<i>Renewable energy provisions – potential areas for development</i>	54
4.7.3	<i>Green Spaces</i>	54
4.8	<i>Landscape & the historic environment</i>	54
4.8.1	<i>Local plans, policies and strategies</i>	55
4.8.2	<i>Scotstoun</i>	55
4.8.3	<i>Kelvingrove and Kelvin Hall</i>	55
4.8.4	<i>SECC Venue complex</i>	56
5.	East cluster, environmental objectives, baseline and context	58
5.1	<i>Introduction</i>	58
5.2	<i>People, health & access</i>	59
5.2.1	<i>Demographics</i>	59
5.2.2	<i>Health and the environmental determinants of health</i>	60
5.2.3	<i>Access</i>	69
5.3	<i>Wildlife conservation & ecosystem services</i>	76
5.3.1	<i>Statutory and non-statutory conservation designations</i>	77
5.3.2	<i>LBAP habitats and species</i>	78
5.3.3	<i>Green network</i>	78
5.4	<i>Water bodies & flooding</i>	81
5.4.1	<i>Local plans, policies and strategies</i>	82
5.4.2	<i>Water quality</i>	82
5.4.3	<i>Flood risk</i>	83
5.4.4	<i>Hydromorphology</i>	83
5.5	<i>Air quality, noise & dust</i>	84
5.5.1	<i>Air quality</i>	84
5.5.2	<i>Road project related air quality issues</i>	85
5.5.3	<i>Noise</i>	86
5.6	<i>Soils & soil quality</i>	86
5.6.1	<i>Contaminated land</i>	86
5.6.2	<i>Soil cleaning</i>	86
5.7	<i>Landscape & the historic environment</i>	86
5.7.1	<i>Local plans, policies and strategies</i>	87
5.7.2	<i>Athletes' Village, NISA, Sir Chris Hoy Velodrome and Celtic Park</i>	87
5.7.3	<i>Glasgow Green</i>	88
5.7.4	<i>NISA and Sir Chris Hoy Velodrome</i>	88
5.7.5	<i>Tollcross Swimming Pool</i>	89
5.7.6	<i>Conclusions</i>	89
6.	South cluster, environmental objectives, baseline and context	90
6.1	<i>Introduction</i>	90
6.2	<i>People, health & access</i>	90
6.2.1	<i>Demographics</i>	90
6.2.2	<i>Health and the environmental determinants of health</i>	91
6.2.3	<i>Access</i>	100
6.3	<i>Wildlife conservation & ecosystem services</i>	100
6.3.1	<i>Statutory and non-statutory conservation designations</i>	100
6.3.2	<i>LBAP Habitats and Species</i>	102

6.4	Water bodies & flooding.....	106
6.4.1	Local plans, policies and strategies.....	106
6.4.2	Water quality.....	106
6.4.3	Flood risk	106
6.5	Air quality, noise & dust.....	107
6.5.1	Air quality	107
6.5.2	Noise.....	107
6.6	Soil	108
6.7	Climate change issues.....	108
6.7.1	Flood risk provisions.....	108
6.7.2	Renewable energy provisions – potential areas for development.....	108
6.7.3	Green Spaces	108
6.8	Landscape & the historic environment.....	108
6.8.1	Local plans, policies and strategies.....	109
6.8.2	Ibrox	109
6.8.3	Hampden Park and Toryglen	109
6.8.4	Cathkin Braes.....	110
7.	Environmental problems and opportunities identified.....	111
8.	SEA Framework.....	116

Part B Relevant Appendices

Appendix E: Long list of plans, programmes and strategies of relevance to the CG Strategy and Framework
Appendix F: Taking account of responses to the Scoping consultation
Appendix G: Glasgow-wide environmental baseline information summary statement
Appendix H: Strategic sensitivities map
Appendix I: Cumulative strategic sensitivities maps
Appendix J: SEPA River Basin Management Plan Data Sheets
Appendix K: Key environmental issues workshop briefing note

List of Figures

Figure 2.1 Model for causal chain analysis	17
Figure 2.2 Approach to GRN traffic management/ vehicle fleet assessment.....	24
Figure 4.1 West Local CPP area	35
Figure 4.2 Central and West Local CPP area	36
Figure 4.3 Byres Road and Dumbarton Road Air Quality Management Area	51
Figure 5.1 Population distribution in the Clyde Gateway area	62
Figure 5.2 Calton and East Centre Local CPP area	63
Figure 5.3 East Glasgow greenspace provision	68
Figure 5.4 Estimated annual mean background NO2 concentrations in Glasgow and the surrounding area	70
Figure 5.5 Parkhead Cross Air Quality Management Area	84
Figure 6.1 Govan and Craigton Local CPP area	92
Figure 6.2 Linn and Langside Local CPP area	93
Figure 6.3 South east Glasgow greenspace provision	98
Figure 6.4 South east Glasgow greenspace provision	99

List of Tables

Table 2.1 Stakeholder consultation and engagement undertaken in the CG Strategy and Framework SEA..	6
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Table 2.2 SEA topics and sub-topics.....	9
Table 2.3 Definition of environmental effects	11
Table 2.4 Criteria for evaluating significance of environmental effects	12
Table 2.5 Summary of staged approach to assessment.....	13
Table 2.6 Key to compatibility scoring	15
Table 2.7 CCA outcomes summary approach.....	17
Table 2.8 Spatial analysis outcomes summary approach.....	17
Table 2.9 Detailed assessment matrix summary approach	19
Table 2.10 Mitigation strategies considered in the pre-games assessment.....	21
Table 3.1 Key PPS reviewed and implications for the CG Strategy and Framework and SEA	28
Table 4.1 West cluster proxy population statistics	33
Table 4.2 Summary findings from the West Local CPP 'Cleansing and Environment' survey	34
Table 4.3 Summary findings from the Central and West Local CPP 'Cleansing and Environment' survey...	37
Table 4.4 Summary findings from the West Local CPP 'Quality of your Neighbourhood' survey.....	37
Table 4.5 Summary findings from the Central/ West Local CPP 'Quality of your Neighbourhood' survey.....	38
Table 4.6 Glasgow west, key health outcome indicators that may be influenced by environmental factors..	39
Table 4.7 West cluster conservation designations.....	42
Table 4.8 Pressures and threats affecting key Glasgow LBAP habitats and species	43
Table 4.9 2006 and 2010 predicted NO ₂ levels for the Byres Road and Dumbarton Road AQMA.....	50
Table 4.10 NO ₂ vulnerable locations in the west cluster area	51
Table 5.1 East cluster proxy population statistics	60
Table 5.2 Summary findings from the Calton/ East Centre Local CPP 'Cleansing and Environment' survey	63
Table 5.3 Summary findings from the Calton/ East Centre Local CPP 'Quality of your neighbourhood' survey	64
Table 5.4 Summary findings from the Calton/ Bridgeton 'Quality of your neighbourhood' survey	64
Table 5.5 Summary findings from the Parkhead/ Dalmarnock 'Quality of your neighbourhood' survey	65
Table 5.6 Glasgow east, key health outcome indicators that may be influenced by environmental factors...	67
Table 5.7 East cluster PPS and their potential environmental/ health implications	71
Table 5.8 East cluster conservation designations.....	77
Table 5.9 Green network opportunities and issues to consider in the east cluster area	79
Table 5.10 2006 and 2010 (predicted) NO ₂ levels for the Parkhead Cross AQMA.....	84
Table 6.1 South cluster proxy population statistics	91
Table 6.2 Summary findings from the Govan/ Craigton Local CPP 'Cleansing and Environment' survey.....	92
Table 6.3 Summary findings from the Linn/ Langside Local CPP 'Cleansing and Environment' survey.....	94
Table 6.4 Summary findings from the Govan/ Craigton Local CPP 'Quality of your neighbourhood' survey.	94
Table 6.5 Summary findings from the Linn/ Langside Local CPP 'Quality of your neighbourhood survey	95
Table 6.6 Glasgow south, key health outcome indicators that may be influenced by environmental factors.	96
Table 6.7 South cluster conservation designations	101
Table 6.8 Pressures and threats affecting key Glasgow LBAP habitats and species	103
Table 6.9 NO ₂ vulnerable locations in the south cluster area.....	107
Table 7.1 Summary of key environmental problems and opportunities that the CG Strategy and Framework may influence	111
Table 8.1 SEA Framework	116

1. ENVIRONMENTAL REPORT PART B STRUCTURE

Part B of the Environmental Report (ER) summarises the environmental baseline and key relationships between the Commonwealth Games (CG) Strategy and Framework and other relevant plans, programmes and strategies (PPS) and environmental protection objectives. Establishing the environmental baseline and context is important to understanding the relevant environmental problems, sensitivities and opportunities that the ongoing development of the CG Strategy and Framework should consider. The environmental baseline and context has informed the development of the 'SEA Framework' against which the potential environmental effects of the CG Strategy and Framework have been assessed and will be monitored.

ER Part B also summarises the overall approach to the SEA of the CG Strategy and Framework. This includes a summary of the approach adopted during scoping and a more detailed breakdown of the assessment methodology. The approach follows the relevant legislation and draws on guidance, especially the Scottish Government's SEA Toolkit (Scottish Executive, 2006), the UK's Practical Guide to the SEA Directive (ODPM et al, 2005) and the various pieces of SEA topic specific guidance produced by the Scottish Government and SNIFFER. The approach has also been tailored to meet the very specific needs of the assessment of the CG Strategy and Framework. Please refer to Environmental Report Part A for a summary of the CG Strategy and Framework's key provisions. ER Part B is structured as follows:

- **Chapter 2** describes the approach adopted in the CG Strategy and Framework SEA including scoping, assessment and development of mitigation, enhancement and monitoring recommendations;
- **Chapter 3** outlines the relationship of the CG Strategy and Framework with other key plans, programmes, strategies (PPS) and environmental protection objectives including a summary of implications for the SEA and ongoing development of the CG Strategy and Framework;
- **Chapters 4, 5 and 6** summarise the environmental baseline, PPS and environmental protection objectives (the 'environmental context') of relevance to the CG Strategy and Framework in the areas encompassed by the West, East and South clusters respectively;
- **Chapter 7** highlights the key environmental problems and opportunities of relevance to the CG Strategy and Framework; and
- **Chapter 8** outlines the SEA Framework against which the potential environmental effects of the CG Strategy and Framework have been assessed and will be monitored.

2. SEA APPROACH

This Chapter outlines the overall approach adopted in the SEA of the CG Strategy and Framework. In particular, a description is provided of how key provisions from the CG Strategy and Framework have been assessed and SEA recommendations developed. A summary is also provided of the approach adopted to SEA tasks that were undertaken prior to the assessment/ reporting stage. After screening and making a decision that SEA was required, the main stages of SEA undertaken have been:

- Setting the context, developing SEA objectives, establishing the environmental baseline and deciding on the scope;
- Defining the CG Strategy and Framework for the purposes of SEA and identifying provisions that can be meaningfully assessed; and
- Assessing the CG Strategy and Framework and preparing the Environmental Report.

Further to consultation on this Environmental Report and the CG Strategy and Framework, consultation responses will be collated and accounted for in final decision-making stages. Once adopted, the significant environmental effects of the CG Strategy and Framework will be monitored.

2.1 Overview of approach

The SEA of the CG Strategy and Framework is truly unique and has necessitated the development of a highly bespoke SEA approach. A key issue faced by Glasgow 2014 Ltd and their partner organisations was the question of when to commence the SEA process – too early and there would be insufficient material to assess, too late and the opportunities for the SEA to influence the development of the plan would be missed. As the SEA commenced after the bid stage, opportunities to influence the Games' overall strategy and 'strategic level' alternatives were limited. An example of such 'strategic level' alternatives is the approach to venue provision where reasonable alternatives may include 1) development of all new venues; 2) a mixture of new and refurbished venues; or 3) exclusive use of existing/ refurbished venues.

What's more, a substantial majority of the new Games venues were planned prior to the Games as outlined in ER Part A section 2.3.1¹ whilst other events will be held in existing Glasgow/ satellite location venues. As a result, the overall approach to the Games' strategy has been very much dictated by the location of both the existing and new venues. Clearly this has a knock on effect on all other aspects of the strategy including the location and type of public realm and transport infrastructure enhancements required, the Games-time transport plan provisions (e.g. route, location and type of traffic management measures etc) and the Games-time waste management provisions. Given the above, the opportunities for the SEA to influence the ongoing development of the CG Strategy and Framework are limited in two key ways:

- Limited opportunity to influence the overarching strategy including the development, assessment and refinement of reasonable alternatives; and
- The Games' spatial strategy (as dictated by the availability of suitable existing and planned venues) is already defined thus limiting any opportunities for the SEA to recommend alternative locations for venues and other Games related infrastructure.

Despite this, there are still a broad range of opportunities for the SEA to inform the development of the CG Strategy and Framework going forward, particularly in relation to pre-games and Games-time provisions.

¹ It should be noted that the development of these projects had been informed by the SEA of City Plan 2.

The approach adopted in the pre-games assessment has focused very much on the identification of realistic and tangible opportunities whereby the CG Strategy and Framework's potential neutral and minor positive effects can be enhanced to deliver a stronger, more significant cumulative environmental benefit. Indeed the approach taken to the SEA as a whole has focused on the identification of a framework of environmental opportunities that the CG Strategy and Framework can capitalise on. It is hoped that many of these opportunities and recommendations are acted on to help secure a strong environmental as well as socio-economic legacy from the Games that can benefit Glasgow and its residents in years to come.

In addition to its many environmental strengths, a key objective of the CG Strategy and Framework is to catalyse the socio-economic regeneration of several parts of Glasgow bringing new housing, population, business, industry and recreational facilities. Development on this scale will undoubtedly come with an environmental impact. A key aim of this SEA is to provide transparent, impartial evidence on the scale and significance of this impact to help balance objectives for socio-economic development with those for environmental protection. Within the scope of the constraints outlined above, a broad suite of mitigation recommendations have been made to reduce the potential negative effects of the Games.

2.2 Scoping the SEA

Scoping the SEA of the CG Strategy and Framework involved the following key tasks:

- Identifying how the CG Strategy and Framework may influence and be influenced by other relevant plans, programmes and strategies (PPS) and environmental protection objectives;
- Collation of environmental baseline information related to the CG Strategy and Framework and the environment likely to be affected;
- Developing DRAFT SEA objectives, assessment criteria and significance criteria as a framework against which the potential environmental effects of the CG Strategy and Framework were assessed;
- Identifying key environmental problems, sensitive areas and opportunities relevant to the CG Strategy and Framework; and
- Consulting on the proposed scope of the SEA.

2.2.1 Approach to scoping

Scoping is an iterative process and all tasks undertaken informed each other throughout their development. Whilst the scoping consultation in September 2009 marked the end of the formal scoping process, all scoping tasks were refined substantially during early 2010 following the appointment of two Commonwealth Games SEA technical officers. This refinement stage culminated in a key environmental issues workshop with all relevant stakeholders in early May 2010. The outcomes of this workshop and all other scoping meetings and informal engagement processes informed the development of scoping tasks as summarised in section 2.3. Appendix F provides a detailed analysis of how scoping consultation responses from the three statutory consultees have been incorporated in the approach to the SEA.

2.2.2 Key scoping tasks undertaken

Identifying other relevant plans, programmes and strategies and environmental protection objectives

The review of other relevant plans, programmes and strategies (PPS) helped to identify potential constraints/tensions and synergies that outside factors may place on the development and implementation of the CG Strategy and Framework and *vice versa*. For example, the CG Strategy and Framework has the potential to

work towards delivering national and local level health objectives by supporting development that improves access to and encourages outdoor recreation. The process also helped highlight the potential for significant cumulative effects issues caused by the CG Strategic Framework's strategic actions in combination with those of other relevant PPS.

In addition, the review of other relevant PPS was instrumental in identifying potential SEA objectives, assessment criteria and baseline information. These were considered and, where appropriate, incorporated into the SEA framework (see Chapter 8). A summary of the relationships between the CG Strategy and Framework and the most relevant PPS is provided in Chapter 3. A full list of the PPS considered is provided in Appendix E.

Collation of environmental baseline information

An initial review of available baseline data was undertaken during the scoping stage which sought to identify, as far as possible the following information: 1) the current state of the environment; 2) past and likely future trends; and 3) key current environmental problems, sensitive areas and opportunities of relevance to the ongoing development of the CG Strategy and Framework. The initial approach was to collate broad environmental information for all SEA topics:

- Population and human health;
- Biodiversity, Flora and Fauna;
- Water;
- Soil;
- Air;
- Climatic Factors;
- Material Assets; and
- Townscape, landscape and the historic environment.

This informed the identification of key environmental issues and both these and the initial draft baseline were consulted on externally during the statutory scoping consultation. As a consequence of the scoping consultation, refinement of scoping tasks as outlined above and subsequent informal engagement activities, a number of environmental issues and opportunities have emerged as being particularly important to the ongoing development of the CG Strategy and Framework. These are primarily, but not exclusively related to population and human health, biodiversity, flora and fauna, climatic factors, water and flood risk and air quality and air pollution. The implications of these key issues and opportunities are discussed in further detail in Chapter 7.

Developing the SEA Framework

The scoping tasks described above informed the development of the following: 1) headline SEA objectives; 2) sub-objectives or assessment criteria; 3) significance criteria; and 4) draft indicators. These elements, which constitute the SEA framework, were used to help predict and evaluate the environmental effects of the CG Strategy and Framework as documented in Part C of the Environmental Report. Following on from the scoping consultation, refinement of scoping tasks and the key environmental issues workshop, the SEA framework was refined to take account of scoping responses received on the Scoping Report and any new issues that arose. The SEA Framework is provided in Chapter 8.

2.2.3 Taking account of responses to the scoping consultation

The key outcomes from scoping were documented in an SEA Scoping Report. This was consulted on between September and October 2009. A number of responses were received from the statutory Consultation Authorities; Scottish Natural Heritage (SNH), Scottish Environment Protection Agency (SEPA) and Historic Scotland. Where practicable, these responses were accounted for in the revised approach to

the SEA which is described below in sections 2.5 to 2.11. Appendix F describes in detail how specific scoping responses were incorporated into the revised approach to the SEA.

2.3 Stakeholder consultation and engagement

The approach taken to stakeholder consultation and engagement involved both formal statutory consultation and also more informal consultation and engagement activities. The overall aim of the approach was to be as inclusive and transparent as possible given the timescales and other constraints. Table 2.1 summarises who was involved and when in the SEA of the CG Strategy and Framework.

Statutory consultation was undertaken on the SEA Scoping Report, submitted to the Scottish Government SEA Gateway in September 2009. Consultation on this Environmental Report fulfils Glasgow 2014 Ltd's statutory requirement to consult on the significant environmental effects of the CG Strategy and Framework. The scoping consultation helped to identify relevant environmental issues and baseline information and also informed the approach taken to the assessment.

As the development of the SEA unfolded, a significant amount of time and effort was spent on planning and undertaking informal consultation and engagement. This was necessary to, on a more ad hoc basis, capture information, opinion and guidance from various stakeholders including:

- The statutory SEA Consultation Authorities (SNH, SEPA and Historic Scotland);
- Glasgow City Council;
- North and South Lanarkshire Councils;
- City of Edinburgh Council;
- Angus Council;
- RSPB;
- WWF;
- Scottish Water; and
- Glasgow and Clyde Valley (GCV) Green Network.

Informal engagement and consultation was carried out using various approaches including meetings, workshops, phone calls, email and questionnaires. More detail on approach is provided in Table 2.1.

To help us achieve a strong environmental legacy from the Games and importantly, one that has the backing and support of the City's residents, we will be holding five environmental community consultation events across Glasgow in late November and December 2010. Our aim is to ensure that the SEA consultation reaches as broad a spectrum of the public as possible. The events will provide attendees with an opportunity to highlight local environmental issues of importance to them and their communities. Comments and suggestions will help to shape the Games' environmental legacy by helping us to prioritise which SEA recommendations will be taken forward.

Table 2.1 Stakeholder consultation and engagement undertaken in the CG Strategy and Framework SEA

Date	Type of consultation/ engagement activity	Attendees	Aim of event	Notes on approach
March 30 th 2010	Glasgow 2014 Commonwealth Games Environment Sub-group meeting	<ul style="list-style-type: none"> • Glasgow City Council • Glasgow 2014 Ltd • Scottish Water • SNH • SEPA • GCV Green Network 	<ul style="list-style-type: none"> • To update on progress towards key Games transport and environment related projects including the SEA • To outline the proposed approach to the SEA and highlight the next steps in the process and expected timescales 	Round table discussion
May 7 th 2010	SEA key environmental issues workshop	As above	<ul style="list-style-type: none"> • To capture feedback from key stakeholders on the INITIAL DRAFT framework of environmental issues, pressures/ threats and opportunities identified of relevance to the ongoing development of the CG Strategy and Framework and SEA • Following the event, workshop outputs were analysed to produce a refined framework which then helped to inform the development of the SEA Framework and other detailed elements of the assessment methodology 	Carousel style workshop (see Appendix K for further information)
June 11 th 2010	Glasgow 2014 Commonwealth Games Environment Sub-group meeting	As above	<ul style="list-style-type: none"> • To update on progress towards key Games transport and environment related projects including the SEA • To provide feedback on the outcomes of the SEA key environmental issues workshop held in June • To introduce elements of the proposed SEA assessment methodology prior to the key stakeholder Environmental Report Parts A and B mini consultation during the last two weeks of June 	Round table discussion

2.4 Collation of environmental baseline information

In order to support the assessment and monitoring of the potential effects of implementing the CG Strategy and Framework, a description of the existing state of the environment, relevant to the objectives and geographical scope of the CG Strategy and Framework, has been compiled. The remainder of this section summarises the approach adopted to the collation of environmental baseline information and how it has informed the SEA process and ongoing development of the CG Strategy and Framework.

2.4.1 Description of the environmental baseline

The environmental baseline presents information on the current and potential future environmental problems, sensitive areas and opportunities relevant to the CG Strategy and Framework. The likely future state of the environment in its absence has been predicted by establishing, reviewing and extrapolating past trends, where relevant, and through discussions with various key stakeholders. In addition, the review of other relevant PPS has identified a number of statutory targets (such as air quality objectives) and non-statutory policy aspirations and objectives (such as the objectives for green network development in the Clyde Gateway area) for the environment. Consideration of how these targets, actions, objectives and aspirations may affect the environment, both positively and negatively have been key in predicting its likely future state. Information on the likely future state of the environment is provided at a topic and sub-topic specific level throughout Chapters 4, 5, and 6 and in Appendix G (Glasgow-wide environmental baseline summary statement).

The identification of current and likely future environmental problems, sensitive areas and opportunities has helped to inform other aspects of the SEA and the ongoing development of the CG Strategy and Framework. The SEA objectives and assessment criteria have been aligned with the potential environmental effects of the CG Strategy and Framework along with consideration of the potential significance of these effects given the existing environmental problems in the areas likely to be affected. This aims to ensure that the assessment stages of the SEA process have been focused on fully understanding the potential implications that the CG Strategy and Framework may have on the environment. The environmental baseline (in conjunction with the review of other relevant PPS and environmental protection objectives) has identified environmental opportunities in affected areas where the ongoing development of the CG Strategy and Framework can work towards achieving environmental goals whilst simultaneously delivering economic and social regeneration. These are discussed further in Chapter 7.

Finally, consideration of the environmental baseline and the key environmental problems and sensitive areas has helped to identify and develop a suitable approach to monitoring the potential significant environmental effects of implementing the CG Strategy and Framework.

The environmental baseline information collation and review of other relevant PPS and environmental objectives has been undertaken at two different scales. Firstly, a broad environmental summary statement of relevance to the whole of Glasgow has been developed (see Appendix G). Secondly, environmental baseline information has been collated at a more detailed level of relevance to the three spatial zones or 'clusters' where Games related activity will be most prevalent (i.e. the West, South and East 'clusters' see ER Part A section 2.3 for further information). In addition, lower level PPS of relevance to specific areas in Glasgow have also been subject to more detailed review. This task has helped to identify local environmental issues and opportunities, baseline information and key local level environmental protection objectives. An example here is the East End Local Development Strategy (the EELDS) which has a number of important implications for Games related activity in the East cluster area. Environmental baseline

information in relation to the Games' satellite venues has been drawn exclusively from the initial Environmental Impact Assessment (iEIA) undertaken at the bid stage and is documented in Appendix G.

2.4.2 Establishing the environmental baseline

Establishing the environmental baseline is undertaken to provide information throughout the SEA process as outlined above. Information sources have included the following key documents:

- City Plan 2 (GCC, 2009);
- East End Local Development Strategy (GCC, 2007);
- Clyde Gateway Business Plan (Clyde Gateway URC, 2006);
- Clyde Gateway Green Network Strategy (LUC, 2007); and
- Glasgow Local Biodiversity Action Plan (GCC, 2008).

In addition, a number of key websites (including those of the Consultation Authorities, Glasgow City Council and the GCV Green Network) have been reviewed and used for additional information throughout the SEA process. A full reference list is provided in Appendix K. Environmental baseline information has been categorised and presented in this report by SEA Topic and sub-topic, as shown in Table 2.2.

Explanation of the approach taken to SEA topic/ sub-topic categorisation

Given the interrelatedness inherent to many environmental issues, SEA can provide an ideal framework for the consideration of interrelationships and the nature of the interactions between plans and the environment including cumulative, secondary and synergistic type environmental effects. Examples of interrelatedness in environmental issues include the relationship between water quality and aquatic ecology, landscape and green network and that between air quality and human health. To help order the analysis of interrelationships and inform the assessment of environmental effects, a useful starting point is to develop an appropriate approach to categorising the environment (based on the list of environmental issues in Schedule 3 of the Environmental Assessment (Scotland) Act). Given that some SEA sub-topics/ issues can encompass elements of more than one overarching or headline SEA topic, a rational approach must be taken to their categorisation. This does not preclude their consideration under other headline topics as a key requirement of the SEA Directive and Act is the consideration of the interrelationships between topics and issues (supporting the wider consideration of the full range of potential cumulative environmental effects).

A key example of this issue in the SEA of the CG Strategy and Framework is consideration of green network. As discussed in more detail in Appendix G section 2.4, green network can mean different things to different people. What is agreed in national, regional and local level planning policy is that an effective green network should support multiple objectives including health improvement, stronger communities, biodiversity and environmental enhancement and enterprise development. Key issues for the CG Strategy and Framework to address regarding green network provision include access and healthy routes (under 'population and human health'), habitat networks/ biodiversity protection and enhancement (under 'biodiversity, flora and fauna'), SuDS (under 'water') and climate change adaptation and mitigation (under 'climatic factors'). For sake of argument, the majority of green network baseline information has been collated under the topic of 'biodiversity, flora and fauna'. Additional information has been collated as appropriate under other topics, particularly 'population and human health'.

Clearly green network is a highly interrelated issue and an effective assessment of the potential environmental effects (both positive and negative) of the CG Strategy and Framework has necessitated a highly integrated approach. In particular, the assessment of cumulative effects has carefully considered the

interrelationship between green network effects per se (e.g. the physical enhancement/ protection of the green network) and other issues including access, health and species resilience to climate change.

Table 2.2 SEA topics and sub-topics

Headline SEA Topic	Sub-topics
People, health & access	<ul style="list-style-type: none"> • Demographics • Health and the environmental determinants of health • Access
Wildlife conservation & ecosystem services	<ul style="list-style-type: none"> • Statutory and non statutory conservation designations • LBAP habitats • LBAP species • Woodland • Green network
Water bodies & flooding	<ul style="list-style-type: none"> • Water quality (by water body) • Water pollution (by source) • Flood risk • Hydromorphology
Air quality, noise & dust	<ul style="list-style-type: none"> • Air quality (by pollutant) • Air pollution (by source) • Nuisance (odour, noise and dust)
Soils & soil quality	<ul style="list-style-type: none"> • Soil quality and structure • Soil erosion and soil sealing • Soil contamination
Climate change issues	<ul style="list-style-type: none"> • Greenhouse gas emissions • Climatic/ weather conditions • Local impacts of climate change in Glasgow • Local climate change impact adaptation measures in Glasgow • Energy and renewable energy • Carbon dioxide sinks
Landscape & the historic environment	<ul style="list-style-type: none"> • Built historic environment • Buried historic environment • Townscape character • Public realm • Landscape

2.4.3 Mapping of strategic sensitivities and opportunities

This task aimed to identify key environmental and legislative sensitivities, vulnerabilities and opportunities in the area affected by the CG Strategy and Framework. The Glasgow area was mapped using environmental data that was readily available in GIS format. This task was undertaken to identify which parts of Glasgow are vulnerable, in environmental terms, to the potential negative effects of Games related activities to inform the assessment of significant environmental effects. In addition, this task played a key role in the identification of several key environmental opportunities.

Through the use of the GIS overlay function, it was possible to identify areas where several vulnerabilities are coincidental e.g. legislative constraints from natural/ cultural heritage designations may mean that the impact of Games related development on sites where there are several designations has potential to be particularly significant and appropriate mitigation measures should be sought. This approach was particularly useful during the assessment of the Games-time Transport Strategic Plan as described in section 2.8.2.

Assessment of sensitivities was undertaken by ranking and overlaying strategic sensitivities in a GIS to produce a cumulative sensitivities map. This process delineated the range of combined sensitivities in the Glasgow area from very low to high ratings. Strategic indicators addressing the following were analysed:

- Green Network (encompassing corridors of landscape/ wildlife Importance, Sites of Special Landscape Importance and ancient, long-established or semi-natural woodland);
- Local Nature Reserves (LNRs) and local and city-wide Sites of Importance for Nature Conservation (L-SINCs and C-SINCs); and
- Conservation Areas, Listed Buildings (Category A), Gardens & Designated Landscapes and Scheduled Monuments.

Where three or more designated areas are coincidental, a cumulative sensitivity rating of 'High' was given; where there were two designated areas a rating of 'Medium' was given; where there was one designated area a rating of 'Low' was given; and where there were no designated areas a rating of 'Very Low' was given. Zoning an area as having 'Very Low' cumulative sensitivity does not preclude it from assessment or imply that environmental effects arising from CG Strategy and Framework in these areas will not be insignificant. In particular, cumulative effects in these areas may contribute to significant environmental effects that need to be carefully considered in the ongoing development of the CG Strategy and Framework.

The maps developed were used in conjunction with other information from the environmental baseline, including key issues and trends to support a rational approach to environmental sensitivity and opportunity characterisation of the Glasgow area. Characterisation considered relevant statutory and non-statutory environmental protection objectives, relationships with other relevant PPS, key trends, key environmental issues and key statutory/ non-statutory targets e.g. air quality objectives, green-belt etc. Please refer to Appendix H (strategic sensitivities maps) and I (cumulative sensitivities maps) for further information.

2.5 Introduction to the assessment of effects

The approach taken to assessing the potential environmental effects of the CG Strategy and Framework was split into four key stages reflecting its different provisions and the timeframes inherent to their delivery (pre-games and games-time). The four stages of assessment are summarised in Table 2.5.

The Environmental Assessment (Scotland) Act (2005) requires that significant environmental effects are identified, described and evaluated. The criteria used for evaluating the significance of predicted environmental effects are shown in Table 2.4. These criteria were developed to take account of key environmental issues of relevance to the CG Strategy and Framework and also the key types of environmental effect it is likely to give rise to (based on an understanding of how its various provisions are likely to be implemented 'on the ground'). In addition, and in line with the requirements of Schedule 2 of the Environmental Assessment (Scotland) Act, the significance criteria have been developed to account for the following types of environmental effect: 1) secondary, cumulative and synergistic; 2) short, medium and long term; 3) permanent and temporary; and 4) positive and negative.

The definition of different types of environmental effect as adopted for the assessment of the CG Strategy and Framework are shown in Table 2.3. The various stages of the assessment have been summarised in several ways as described in sections 2.6 to 2.10 below. The assessment process involved an appraisal of each CG Strategy and Framework element under consideration (e.g. the four spatially orientated pre-games programmes of development activity, relevant provisions from the games-time 'Transport Strategic Plan' etc) to identify potential environmental effects. Each individual assessment was informed by assessment criteria,

the environmental baseline, key issues, trends and expert judgement. Finally, the significance criteria were used to facilitate attribution of significance to the effects i.e. to help distinguish a major positive effect from a minor positive effect along a 5 point scale as described in Table 2.4.

Given their nature, it was considered inappropriate and impractical for the outcomes of some elements of the assessment (e.g. assessment of the Transport Strategic Plan's Games Route Network – the 'GRN') to be described in terms of 'significance of effect'. Where this is the case, practical solutions have been sought to ensure that the communication of relevant SEA recommendations can be delivered in a useful and effective manner to inform the development of the CG Strategy and Framework going forward.

Table 2.3 Definition of environmental effects

(Source: SNIFFER, 2008)

List of effects	Working definition
Environmental effect	Detectable change to an environmental variable caused directly or indirectly by the implementation of a PPS. Environmental effect is often used synonymously with environmental impact but the former can also be used to imply that a value judgement has been made on the importance or significance of an environmental change
Environmental impact	Any alteration of environmental conditions or creation of a new set of environmental conditions, adverse or beneficial, caused or induced by the action or set of actions under consideration
Permanent/ Temporary	Some actions may have permanent or temporary effects
Probable / Improbable	The consequence of actions may be probable or improbable
Reversible / Irreversible	Some actions may have reversible or irreversible effects
Indirect	Effects, which are not a direct result of the PPS, often occurring away from the action (e.g. quarrying aggregates for road building) or as a result of a complex pathway
Secondary (and tertiary) effects	Effects that are consequential from direct or primary effects of the action, but occur away from the original effect or as a result of a complex pathway
Cumulative effects	Effects that result from incremental changes to the environment caused by the PPS together with past, present and future actions. These effects can result from individually minor but collectively significant actions taking place over a period of time. In relation to SEA, the significance of a single effect can be increased when combined with other effects. Several actions may each have insignificant effects but together have a significant effect or, several individual effects of the PPS may have a combined effect
Synergistic effects	A type of cumulative effect that results when the interaction of a number of impacts is greater than or different from the sum of the individual impacts
Transboundary effects	Significant environmental effects on another EU Member State
Cross-border effects	Effects arising from a PPS produced within one country in the UK (e.g. Scotland) causing effects in another (e.g. England, Wales or Northern Ireland)

Table 2.4 Criteria for evaluating significance of environmental effects

Score	Description
Major Positive (++)	A principle, project or action very likely to lead to a significant improvement, or a series of long-term improvements, leading to large-scale and permanent benefits to the achievement of the SEA objective being appraised. A major positive effect is also likely to have cumulative and indirect beneficial effects
Minor Positive (+)	A principle, project or action likely to lead to significant moderate improvement in both short and long-term, leading to large scale temporary, or medium scale permanent benefits to achievement of the SEA objective being assessed. Even where beneficial effects are felt to be temporary, they should not be easily reversible in the long-term (to detriment of the SEA objective)
Neutral (0)	A principle, project or action which is unlikely to have any significant beneficial or negative effects on achievement of the SEA objective being assessed in either the short, or long-term. A neutral score is not the same as 'uncertain', where an appraiser is not sure if an effect is likely to be positive or negative, or 'mixed'. Where the appraiser feels that the effects are likely to be both positive and negative (see below for more detail)
Minor Negative (-)	A principle, project or action likely to lead to significant moderate damage or loss in both short and long-term, leading to large-scale temporary, or medium scale permanent negative effect on achievement of the SEA objective. An action which may also have limited cumulative and indirect detrimental effects and/ or limited degradation of conditions outside the specific strategy area
Major Negative (--)	A principle, project or action likely to lead to a significant or severe damage or loss, or series of long-term negative effects, leading to large-scale and permanent negative effects on achievement of the SEA objective being assessed. It may also have significant cumulative and indirect detrimental effects. A principle, project or action which is likely to threaten environmental thresholds or capacities in areas already under threat. The detrimental effects will be hard to reverse. Any damage or detrimental effect in or to environmentally sensitive areas, issues or landscapes which are recognised and/ or protected locally, regionally, nationally or internationally should be scored as a major negative
Mixed	The effect is likely to be a combination of beneficial and detrimental effects, particularly where effects are considered on sub-issues, areas or criterion. For example a principle, project or action may enhance the viability of certain protected species or habitats (such as native woodlands), but, through this, damage existing (non-native) habitats which may themselves be important. Such mixed effects will be hard to predict, but could be significant in the long-term, or when taken with other effects e.g. cumulative or synergistic
Uncertain (?)	The effect of a principle, project or action is not known, or is too unpredictable to assign a conclusive score. The appraiser is not sure of the effect. This may be the case where an action covers a range of issues, or where the manner in which the action is implemented will have a material impact on the effects it will have

Table 2.5 Summary of staged approach to assessment

Assessment stage	Tasks	Key aims
Stage 1 Assessment of CG Strategic Framework	<ul style="list-style-type: none"> • Environmental commentary on strategic elements of the CG Strategic Framework • Compatibility analysis of the CG Strategic Framework's objectives with SEA objectives 	<ul style="list-style-type: none"> • To help identify potential conflicts and synergies with environmental objectives • To focus the more detailed assessment by highlighting key environmental issues and potential environmental effects
Stage 2 Assessment of pre-games provisions	<ul style="list-style-type: none"> • Causal chain analysis of generic categories of pre-games development • Spatial analysis of all pre-games development project within each of the three Glasgow based programmes of pre-games development • Detailed assessment of the three Glasgow based pre-games development programmes • Cumulative effects assessment of the three Glasgow based pre-games development programmes 'as wholes' 	<ul style="list-style-type: none"> • To identify environmental effects that may arise from the generic categories of pre-games development activity • To scope the detailed assessment, identify key receptors affected and key cumulative effects issues • To identify the potential environmental effects of implementing the pre-games development programmes • To inform the development of programme specific mitigation and enhancement strategies • To identify the cumulative effect of the programmes 'as wholes'
Stage 3 Assessment of games-time provisions	<ul style="list-style-type: none"> • Causal chain analysis of traffic management measures • Games Route Network (GRN) assessment 	<ul style="list-style-type: none"> • To identify generic environmental effects that may arise as a result of traffic management measures • To identify key environmental constraints and vulnerabilities along the GRN and its constituent journeys and make recommendations for traffic management strategy
Stage 4 Assessment of the cumulative effects of the CG Strategy and Framework as a whole	<ul style="list-style-type: none"> • Cumulative effects assessment of the CG Strategy and Framework as a whole • Development of overarching mitigation and enhancement recommendations of relevance to programme as a whole 	<ul style="list-style-type: none"> • To identify the most significant cumulative effects that may arise as a result of the programme as a whole • To reduce the overall adverse and enhance the overall beneficial effect of the CG Strategy and Framework

2.6 Commonwealth Games Strategic Framework – assessment approach

Given that the CG Strategic Framework is enshrined in the bid document, there is limited scope (and indeed limited benefit) for the outcomes of SEA assessment to influence its provisions. That said, assessing certain elements of the CG Strategic Framework has played a key role in the SEA process and has informed the development of other related provisions from the CG Strategy and Framework:

- Undertaking an environmental assessment of the strategy for the Commonwealth Games has helped to identify its key environmental strengths and weaknesses and also specific aspects of the environment that are likely to be more affected than others (both positively and negatively). This in turn has helped to focus and streamline other aspects of the assessment by 'flagging-up' key environmental issues and effects that have then benefited from more detailed consideration; and
- Preparing an environmentally orientated critique of key provisions from the CG Strategic Framework has helped to highlight potential tensions between the aims and objectives of the Games and relevant environmental objectives. In addition, this analysis has helped to highlight environmental tensions inherent to the strategy itself e.g. the degree to which the Games' environmental commitments are reflected in the strategy's vision and/ or *vice versa*. Where appropriate, this has informed the development of recommendations to be taken onboard through other elements of the CG Strategy and Framework to ensure that relevant environmental commitments are delivered e.g. additional legacy measures and/ or output measures.

2.6.1 Environmental commentary on the CG Strategic Framework

The purpose of this task was to provide a high level commentary and recommendations, from an environmental perspective, on the content and wording of the CG Strategic Framework's vision, principles, strategic issues and output measures. The commentary here has explored tensions between the strategy and environmental objectives and environmental tensions internal to the strategy itself (e.g. the degree to which environmental commitments enshrined in the vision and objectives are followed through in the Strategic Framework's consideration of 'related strategic issues' and output measures).

Given the limitations inherent to the assessment here (see above), there has been limited scope for the SEA to make recommendations for improving the CG Strategic Framework's environmental policy and objectives (e.g. through changes to wording, addition/ removal of policy and objectives etc). The benefit of the assessment here has been to highlight environmental tensions and ensure that these are fully considered and, where appropriate, resolved through other more detailed aspects of the assessment to inform the development of parts of the plan where key decisions are yet to be made. In addition, the approach has highlighted the strategy's key environmental strengths and supported the development of recommendations for capitalising on these strengths in related provisions from the CG Strategy and Framework.

2.6.2 Compatibility analysis of CG Strategic Framework objectives and SEA objectives

This was done using a compatibility analysis approach. The compatibility analysis aimed to identify potential areas of conflict or support between what the CG Strategy and Framework aims to achieve, and relevant aspirations for the environment as per the SEA objectives (see section Chapter 8). The key to scoring the compatibility of the CG Strategic Framework objectives with the SEA objectives is summarised in Table 2.6. Compatibility analysis informed the development of the SEA and CG Strategy and Framework by:

- Identifying areas where the CG Strategy and Framework lacks support for the SEA objectives;

- Identifying aspects of the environment that may be more vulnerable to the potential environmental effects or may be more likely to be affected by the CG Strategy and Framework; and
- Focusing the assessment of environmental effects on key issues.

Table 2.6 Key to compatibility scoring

Score	Description of score
✓	CG Strategic Framework objective supportive of SEA objectives
✗	Potential conflict between CG Strategic Framework objective and SEA objectives
?	Uncertain whether the CG Strategic Framework objectives conflict or support the SEA objectives
0	CG Strategic Framework objectives have no identified conflict or support of SEA objectives

2.7 Pre-games provisions – assessment approach

As outlined in ER Part A section 2.3, the CG Strategy and Framework’s pre-games provisions consist of a range of built development orientated projects that fall, geographically speaking, within one of four spatial zones or ‘clusters’. For the purposes of SEA, projects falling within these clusters have been considered as ‘pre-games development programmes’ and are: 1) Glasgow West cluster; 2) Glasgow South cluster; 3) Glasgow East cluster; and 4) pre-games development activity planned at the satellite venues (considered as one programme for the purposes of SEA).

Given that SEA is an inherently strategic assessment tool, a key challenge for the pre-games assessment was the need to develop an environmental effects assessment methodology that could account for the inherently site/ project specific nature of the CG Strategy and Framework’s pre-games provisions within a strategic level framework. In essence, the approach had to be able to maintain a strategic level of assessment but facilitate the consideration of project/ site specific issues.

In addition, the assessment method needed to support the development of SEA recommendations that could inform the pre-games development programmes ‘as wholes’ and, where relevant, that of key individual projects. Crucially, it was vital that the assessment could consider how the potential effects of individual projects may interact to give rise to cumulative effects (including indirect, secondary and synergistic type effects). Noting that the effective assessment of cumulative effects is considered inherently difficult on a project by project basis, the most appropriate way forward was considered to be the development of a ‘programmatic’ style assessment approach.

To account for the challenges identified above, a three staged approach to pre-games assessment was developed. The first stage focused on a generic, broad-brush assessment of all individual projects that are planned for a given spatial zone/ cluster (see section 2.7.1). Informed by the first stage, the second took a more detailed approach in considering the effect of the programme ‘as a whole’ across all relevant SEA issues e.g. water, air, population and human health etc (see section 2.7.2). This second stage helped to draw out key individual effects and ascertain their significance in the context of the vulnerabilities of specific environmental receptors likely to be affected (e.g. an Air Quality Management Area, a vulnerable sector of society, designated natural heritage site etc). Informed by stages one and two, the final stage identified key cumulative effects of the programme as a whole (see section 2.7.3).

The assessment approach summarised above then informed the development of ‘programme wide’, mitigation/ enhancement strategies (billed as SEA ‘design guides’) and specific SEA recommendations for

key individual projects (see section 2.7.4). As well as generic recommendations, the three 'SEA design guides' include recommendations for the enhancement/ mitigation of specific effects (both direct and cumulative) and issues to consider when mitigating effects on key individual receptors. The remainder of this section outlines in more detail the approach adopted in the pre-games assessment.

2.7.1 Causal chain and spatial analysis of individual projects

Causal chain analysis (CCA) recognises that environmental systems consist of a complex web of interrelationships and, crucially, that the environmental effect of many types of activity can occur as a result of other 'induced' activities and/ or secondary, cumulative and synergistic effects. The key aim of CCA is to identify the cause-effect or 'causal' links between an initial action and an ultimate environmental outcome or 'resultant effect' (a causal pathway). Due to the explicit manner in which interrelationships and unexpected effects are addressed in CCA, it is particularly useful for identifying several different types of cumulative effect. Spatial analysis as part of this assessment has considered the environmental implications of pre-games development projects given their specific/ local environmental context e.g. proximity to natural heritage sites, pollutant vulnerable water bodies, air quality hot spots etc.

The aim of undertaking causal chain and spatial analysis of individual projects within the three Glasgow based clusters has been to: 1) scope the detailed assessment of the pre-games development programmes; 2) help identify key cumulative effects that the pre-games development programmes may give rise to; and 3) identify the potential environmental effects of individual projects and, where appropriate, inform the development of project specific SEA recommendations. Through the adoption of a rapid/ broad-brush approach, the assessment here has identified potential environmental effects and key areas of environmental risk and opportunity associated with **all** pre-games development projects² within **each** of the Glasgow based spatial development programmes.

CCA has been undertaken for the four generic categories of pre-games development activity. This assessment has helped to scope the types of environmental effect that may arise as a result of a given category of pre-games development project and also the types of receptor that may be affected. It should be noted however that this approach is broad-brush and subjective. Clearly the scope of works for one venue development project may be quite different to that of another. Despite this, venue development projects of a certain scale are likely to share many of the same generic construction orientated impacts. The aim of the assessment here is not to be definitive rather it is to help account for project/ site specific issues through an appropriately detailed assessment given the limitations of SEA.

Figure 2.1 outlines a model for CCA showing how a given category of pre-games development activity may give rise to primary, secondary and tertiary environmental effects. In addition, this model helps to identify 'resultant' environmental effects which in turn highlights the types of receptor that may be affected (e.g. air quality, notified features of designated natural heritage sites etc). For each category of development activity considered, CCA has identified several primary/ secondary/ tertiary effects and several resultant effects and affected receptors (see ER Part C section 3.2.1). Table 2.7 shows how the outputs of CCA have been summarised in Appendix O for the purposes of consultation.

² Pre-games development projects fall within the following categories: 1) venue development projects; 2) public realm enhancement projects; 3) transport infrastructure projects; and 4) environmental enhancement projects (see ER Part A section 2.3 and 2.3.2 for further information). **Please note:** several of the venue projects that will be used during the Games have not been assessed as part of the pre-games assessment (see ER Part A section 2.3.1 for further information).



Figure 2.1 Model for causal chain analysis

Following the CCA, the generic environmental effects and receptors likely to be affected identified were then framed spatially in a cluster/ pre-games development programme specific context (i.e. based on the likely location of pre-games development projects and spatially specific environmental baseline information within each of the three Glasgow based ‘clusters’). This assessment process was facilitated through simple spatial analyses using GIS (e.g. to calculate distances between pre-games development projects and various environmental receptors) combined with the expert judgement of the SEA team. It should be noted however that the assessment here is ‘broad-brush’ and by no means definitive – the key aim was to identify areas of environmental risk and opportunity associated with individual projects to inform the more detailed programmatic assessment (see section 2.7.2).

Table 2.7 CCA outcomes summary approach

Generic category of pre-games development project	Potential primary, secondary and tertiary environmental effects	Potential resultant environmental effects	Potential environmental receptors affected
e.g. Public realm enhancement			
e.g. Environmental enhancement			

The outcomes of the spatial analysis informed the detailed pre-games assessment in three key ways. Firstly, particularly significant effects of key individual projects were identified and refined to inform the development of project specific SEA recommendations. Secondly, identification of key effects and receptors affected helped to scope and inform the detailed assessment of the Glasgow based pre-games development programmes ‘as wholes’. Finally, the CCA and spatial analysis helped to identify key cumulative effects that may arise from pre-games development activity through: 1) highlighting the potential for repeatedly occurring environmental effects within a given pre-games development zone/ cluster; and 2) highlighting receptors that may be repeatedly affected within a given pre-games development zone/ cluster. Table 2.8 shows how the spatial analysis outputs have been summarised in Appendix P for the purposes of consultation.

Table 2.8 Spatial analysis outcomes summary approach

Project	Potential environmental effects	Potential environmental receptors affected	Potential cumulative effects of the programme as a whole
Pre-games development project category: e.g. Competition and non-competition venue development projects			
e.g. Scotstoun Squash Centre		e.g. Byres Rd. and Dumbarton Rd. AQMA	

2.7.2 Detailed assessment of pre-games development programmes

Informed by the CCA and spatial analysis scoping assessment outlined above, a detailed environmental assessment was undertaken of the three Glasgow based pre-games development programmes ‘as wholes’. By adopting a programmatic style approach, this assessment inherently considered the potential cumulative

environmental effect of all projects within a given cluster across all SEA issues (e.g. air, water, population and human health etc) and sub-issues (e.g. air pollution, water quality, recreation and access etc) that were identified during SEA scoping and framed in the SEA framework. Key aims of this assessment were to:

- Identify the full range of significant direct environmental effects that may arise as a result of implementing the pre-games development programmes and the receptors that may be affected (in a spatial context where appropriate);
- Identify significant cumulative effects of the programmes as a whole including those caused by the interactions of direct effects; and
- Inform the development of an overarching mitigation and enhancement strategy for the development programme as a whole including: 1) an SEA 'design guide' on programme wide environmental considerations; 2) mitigation and enhancement recommendations for likely significant environmental effects at a 'programme wide level'; and 3) where appropriate, specific 'project level' SEA recommendations.

Each individual assessment undertaken as part of the four programmatic assessments was informed by cluster specific environmental baseline information including information on key trends/ potential future environmental problems, cluster specific and Glasgow wide environmental issues and opportunities identified during scoping/ environmental baseline analysis and through consultation, the CCA and spatial analysis scoping assessment outlined above and details of the scope and schedule of works for each pre-games development project considered.

The three Glasgow based programmes have been assessed in terms of the degree to which they may support or work against the CG Strategy and Framework's agreed aspirations for the environment framed as SEA objectives (see Chapter 8). This assessment has been further informed by the more detailed assessment criteria which, when imposed on the provision subject to assessment, have helped to identify more detailed areas of support/ conflict with SEA objectives and the associated potential for specific positive and negative environmental effects. Finally, each individual assessment was appraised against the significance criteria (see Table 2.4) to attribute significance to the potential environmental effects identified.

Whilst informed by the consideration of project/ site specific issues, the essence of this approach has been to make an assessment of the degree to which the pre-games development programmes 'as wholes' support or conflict with individual SEA objectives thus summarising the potential for negative, positive and mixed environmental effects. The detailed assessment criteria helped to identify key individual environmental effects against specific SEA sub-issues (e.g. water quality, green network sites, vulnerable sectors of society etc) that the programme 'as a whole' may give rise to. The potential 'programme wide' environmental effects identified informed the development of 'programmatic level' SEA recommendations, which, in turn (and following the outcomes of this consultation), may be rolled out across the various pre-games activities to improve the environmental performance of the pre-games development programmes.

The outcomes of the assessment have been summarised in a matrix with one matrix used per pre-games development programme. The assessment parameters (i.e. the pre-games development programmes) have been listed across the top (horizontal axis) of the matrix, and the SEA objectives down the side (vertical axis) of the matrix. As shown in Table 2.9, comments columns/ rows on the assessment matrices were used to pull out significant issues related to individual projects/ sites where appropriate, potential environmental effects identified through application of the detailed assessment criteria, key environmental receptors that may be affected and 'early stage' mitigation and enhancement recommendations. It should be noted that the assessment matrix is a means rather than an end – matrices have been used to capture and record the

wider assessment processes outlined above and do not constitute 'the assessment' per se. Environmental baseline information and potential environmental effects in relation to the Games' satellite venues has been drawn exclusively from the initial Environmental Impact Assessment (iEIA) undertaken at the bid stage and is documented in Appendix G.

Table 2.9 Detailed assessment matrix summary approach

	Assessment parameter e.g. West cluster pre-games development programme	Summary of potential environmental effects Note: includes positive, negative, mixed, secondary, cumulative and synergistic effects	Mitigation and enhancement recommendations
SEA Objective 1	Overall summary 'score' of assessment parameter's potential effect on the delivery of SEA objective e.g. major positive, neutral, unknown, mixed etc	Describes key potential environmental effects of the parameter that have informed the summary 'score' against the SEA Objective	
SEA Objective 2	As above		
SEA Objective 3	As above		
SEA Objective 4	As above		
Etc.	As above		
<p>Parameter assessment summary Includes a summary of the assessment parameter's key environmental effects (including cumulative effects) and receptors affected. Assessment summary here is categorised by SEA topic.</p> <p>Key positive effects</p> <p>Key negative effects</p>			

2.7.3 Cumulative Effects Assessment (CEA) of pre-games development programmes

As highlighted in Table 2.3 there are different types of cumulative effects but the principal issue in the assessment of the CG Strategy and Framework's pre-games provisions was the overall combined or additive effect of the whole programmes and their multiple projects and actions on single receptors. Single receptors may be certain groups within the population, the water environment or flora and fauna for example. Many impacts arising from the pre-games development programmes are likely to be cumulative (e.g. emissions of air pollutants and greenhouse gases). The various stages of the pre-games assessment helped to highlight the potential for similar environmental effects to occur repeatedly and/ or for the same receptor to be affected repeatedly – either in geographic (e.g. a given site/ habitat or waterbody) or categorical (e.g. certain groups within the cluster's population regardless of where they live) terms. The CCA and spatial analysis of pre-games development projects was particularly useful in this regard.

At this stage, the most significant potential cumulative effects were identified, both positive and negative, which were predicted to occur due to the effects of a number of aspects of the programmes on a particular issue or receptor or location. This was not intended to be an exhaustive list as predicting the interactions and additive effects is complex and uncertain, however these cumulative effects were considered some of the most significant.

2.7.4 Development of pre-games mitigation and enhancement strategy

Generally speaking, SEA recommendations adopt a hierarchal approach to the mitigation of potential negative environmental effects. Where potential negative environmental effects are identified, the preferred option is to avoid the negative effect outright. In SEA, strategies to avoid negative effects can include:

1. Altering or changing the option causing the negative effect;
2. Altering or changing a specific objective or sub-objective within the plan;
3. Altering the technical specifications and design of projects promoted by the plan;
4. Altering the spatial strategy for projects promoted by the plan; and
5. Inclusion of new provisions within the plan or other related plans.

Due to the CG Strategy and Framework's stage in development, SEA mitigation options for the potential negative effects of pre-games development activity are limited in that the location of many projects are already decided. The majority of projects considered in the pre-games assessment are the various enhancements (public realm, transport infrastructure and environment) that are planned for the localities of the competition and non-competition venues. As such, there is limited scope for the SEA to influence the identification of alternative project locations or the development of an alternative spatial strategy (see SEA mitigation strategy 4 above). In addition, the Games Strategy was developed in 2007 and has already informed the approach taken to the development of several key pre-games, games-time and post-games provisions. Given this, there is limited scope (or reason) for the SEA to influence changes in Games Strategy objectives (see SEA mitigation strategy 2 above). Section 2.1 provides further information regarding the limitations inherent to recommendations developed through this SEA process.

Despite this, the SEA has substantial scope to influence the pre-games development programmes' ongoing development, with a view to improving their environmental performance. In particular, a range of strategies to avoid negative environmental effects are still possible (see mitigation strategies 1, 3 and 5). In addition, strategies that seek to reduce the significance of negative effects or, where negative effects are unavoidable, compensate for irreversible environmental damage are available. Table 2.10 outlines the full range of mitigation strategies considered in the development of SEA recommendations flowing from the pre-games assessment.

A key aim of SEA is also to enhance potential positive and/ or neutral environmental effects to improve the overall environmental performance of the plan. Many of the strategies identified in Table 2.10 have also been adopted to enhance the potential positive effects of the CG Strategy and Framework's pre-games provisions. In particular, several additional projects have been recommended which aim to maximise the synergies between the potential positive effects identified and the existing environmental opportunities and strengths within each of the cluster areas.

Mitigation and enhancement strategies have been developed for each of the five pre-games development programmes. At the highest level, a 'pre-games development programme SEA design guide' has been developed for each programme. A number of SEA recommendations have been developed to account for key direct and cumulative effects that the programme as a whole may give rise to. These should be taken into account by all pre-games development programme stakeholders as per above. Finally and only where appropriate, SEA recommendations have been developed to account for particularly significant effects of individual projects. These should be taken into account by project design teams, contractors, GCC planning etc.

Table 2.10 Mitigation strategies considered in the pre-games assessment

Applicability	Mitigation strategy
Pre-games development programme wide/ generic	<ul style="list-style-type: none"> • General recommendations for good-practice during construction phase • Recommendations for the application of technical measures during construction/ operation e.g. buffer zones, design codes etc • Recommendations for the phasing of project construction (e.g. to avoid traffic management/ air quality issues) • Recommendations to inform the scope of SEA and EIA/ planning of 'lower level' plans and projects • Proposals to change the objectives and provisions of other relevant plans, programmes and strategies
Pre-games development project specific	<ul style="list-style-type: none"> • Where relevant, recommendations to inform technical aspects of key projects (e.g. design, site layout/ configuration, site boundary etc) • Recommendations for additional projects, primarily to enhance beneficial effects (note: this is particularly relevant to Games legacy)

Mitigation and enhancement strategies have been further refined through the development of a mitigation and enhancement 'action framework'. For each measure developed this includes the following information: 1) details of the measure required including technical specifications where relevant; 2) details of when the measure should be implemented and its duration (e.g. permanent, temporary etc); and 3) details of who will be required to implement the measure (e.g. one person/ organisation or several). This framework will be subject to several iterations as the roles and responsibilities for implementing SEA recommendations become clear and indeed SEA recommendations are prioritised. A 'version one' has been included in the Environmental Report at this stage for consultation but will be subject to change in the coming months and years as plans progress and priorities change.

2.8 Games-time provisions – assessment approach

At the time of writing, Glasgow City Council Land and Environmental Services, on behalf of Glasgow 2014 Ltd, have developed a draft Glasgow 2014 Commonwealth Games Transport Strategic Plan which has been assessed as part of this SEA. Between consultation on the CG Strategy and Framework/ Environmental Report and the event itself in 2014, it is anticipated that a number of additional games-time PPS will emerge e.g. waste management, energy/ carbon management etc. In line with the requirements of the Environmental Assessment (Scotland) Act, these emerging PPS should be screened for SEA. This section describes the approach adopted in the assessment of the draft Transport Strategic Plan.

The draft Transport Strategic Plan ('the plan') is available for comment alongside this Environmental Report. There is a summary of the plan in ER Part A section 2.4. The assessment has focused primarily on the plan's provisions for the Games family. The appropriateness of assessing subsequent versions of the plan should be considered as and when more concrete transport proposals for spectators and Games workforce are made available. The remainder of this section outlines the approach adopted in the assessment of these three key provisions.

Given its scope and objectives, the plan is likely to give rise to a range of significant environmental effects (both positive and negative). Despite this, many if the plan's provisions are temporary (i.e. they will be in operation during Games-time only) and, as such, the considerable majority of the plan's potential environmental effects are likely to be temporary also. Given this, the assessment approach adopted has focused on the identification of key areas of environmental risk and vulnerability (as opposed to 'environmental effects' per se) that the ongoing development of the plan should account for. Many of these

have been linked spatially to environmental issues along the Games Route Network (see section 2.8.2) and SEA recommendations developed here have been framed in a spatial context accordingly.

2.8.1 Assessment of traffic management measures

Within the scope of an overarching objective of 'keeping the City moving', the various traffic management measures aim to ensure improved journey times for Games vehicles using the Games Route Network by reducing volumes of other vehicles. The following measures are currently under consideration:

- Traffic signal controls and junction improvements;
- Banned turns and road closures (temporary or permanent);
- Kerbside controls;
- Games lanes; and
- Diversion routes.

At present, the measures outlined above are all potential and a spatial strategy/ plan for the implementation of such measures will be developed in due course. As plans progress, the proposed measures will be assessed using traffic modelling with the results feeding back into the planning process. Given this, there exists a key opportunity for the SEA to inform the development of the emerging traffic management plan with a view to improving its overall environmental performance.

The traffic management measures have been assessed using a similar approach to that adopted in the assessment of pre-games provisions described in section 2.7. The key difference between the two approaches is that whilst the pre-games provisions have a spatial dimension (as all the pre-games development projects have a proposed location) there is currently no spatial strategy or plan for the Games Route Network's traffic management measures. To account for this, the assessment here has been undertaken in a generic fashion with no consideration of spatial issues.

A 'generic' Causal Chain Analysis (CCA) of the five proposed traffic management measures has been undertaken to help identify their potential direct and cumulative effects and also the types of environmental receptor that may be affected. The methodological approach adopted is the same as that described in section 2.7.1 for the CCA of pre-games development projects; and

The outcomes of these assessments have been documented in Part C of the Environmental Report as per the pre-games assessments outlined in section 2.7.1. It is anticipated that the outcomes of this assessment and recommendations made will inform the ongoing development of traffic management strategy including the consideration of spatial issues. Specifically, we anticipate the assessment findings here supporting the identification of an *environmentally* optimised spatial strategy for traffic management measure deployment. This will be based on an understanding of the potential environmental effects of individual measures and the sensitivity of the receiving environment for individual Games Route Network journeys.

Following the outcomes of traffic modelling, any information on the proposed spatial strategy (and any alternatives where available) for traffic management measures can be fed back into the assessment to identify, as per the spatial analysis approach adopted in the pre-games assessment, spatially defined areas of environmental risk and opportunity that the ongoing development of the strategy should account for. This spatially orientated assessment would account for local environmental issues of relevance described elsewhere in this part of the Environmental Report (see Chapters 4, 5 and 6, Appendix G and the environmental problems and opportunities summary in Chapter 7). It should be noted that the assessment

here has considered the approach to traffic management strategy from a purely environmental perspective. The outcomes and recommendations from this environmental assessment will have to be balanced with other issues such as practical feasibility and cost.

2.8.2 Assessment of the Games Route Network

Given the early stage in the Games-time Transport Strategic Plan's development, there is a key opportunity for the SEA to inform the development of certain key provisions. Despite this, one provision that is more or less defined at this stage is the specific route adopted by the Games Route Network (the 'GRN'). As outlined in section 2.1, opportunities for the SEA to influence the development and refinement of strategic alternatives (such as alternative routes for the GRN) are limited as many elements of the CG Strategy and Framework's spatial strategy are dictated by the location of existing and planned venues.

Given the above, the approach taken to 'assessing' the GRN has focused on identifying the key environmental vulnerabilities and constraints along the route. As the GRN uses existing roads infrastructure it in itself is unlikely to give rise to any significant environmental effects (e.g. there will be no or very limited construction impacts). The potential for environmental effects to arise will occur as a result of implementing the various traffic management measures and the transport operation itself during games-time. In essence, the constraints/ vulnerability analysis has highlighted key areas of environmental risk and/ or opportunity that the subsequent development of a spatial strategy for traffic management measures should consider.

In the absence of a spatial strategy for traffic management measures, the assessment here has highlighted the potential areas of environmental vulnerability and constraint associated with each GRN journey. In the interests of an efficient approach, the assessment of GRN journeys has been limited to those on the core (Glasgow based) GRN and has only considered journeys between the Athletes' Village and individual venues (i.e. there has been no assessment of venue to venue journeys). Due to the linear nature of the core GRN, many Athletes' Village – Games venue journeys will be broadly similar and share the same environmental vulnerabilities and constraints and/ or, the journeys will overlap (e.g. the Athletes' Village to Scotstoun Squash Centre journey shares approximately half its route with the Athletes' Village to Kelvingrove/ Kelvinhall journey). This has helped to streamline the assessment further thus scoping the assessment to consideration of the following key GRN journeys:

- **GRN Journey 1:** Athletes' Village to the Tollcross National Swimming Centre also encompassing the journey to Parkhead Stadium/ NISA and Velodrome journey;
- **GRN Journey 2:** Athletes' Village to Cathkin Braes also encompassing the journey to the National Stadium at Hampden Park;
- **GRN Journey 3:** Athletes' Village to Ibrox Stadium (**please note:** this journey will utilise the not yet completed M74 extension and has therefore not been assessed at this time); and
- **GRN Journey 4:** Athletes' Village to Scotstoun Squash Centre also encompassing the journey to Glasgow Green, the SECC complex, Kelvingrove and Kelvin Hall.

At this stage, the approach to GRN timetable strategy is not known e.g. where one journey passes several venues, will separate vehicles service each venue or will a fleet of vehicles do multiple drops at all venues passed. The assessment approach outlined here aims to provide a range of information to inform these and other considerations. It is anticipated that the outcomes of this assessment will, from an environmental perspective, provide an invaluable tool for Glasgow 2014 Ltd and Glasgow City Council when weighing up the use of different traffic management options.

The identification of key environmental vulnerabilities and constraints along the GRN and its constituent journeys has been facilitated through spatial analysis using Geographic Information Systems (GIS). A buffer of 300m has been placed around the GRN which has then been overlaid with the strategic sensitivities map (see section 2.4.3). Environmental vulnerabilities/ constraints along the GRN and its constituent journeys have been summarised and characterised on the basis of:

No constraint
Limited issues/ constraints
Significant issues/ constraints
Highly significant issues/ constraints

Based on this knowledge and the outcomes of the traffic management measure assessment, key areas of environmental vulnerability and constraint associated with each GRN journey have been identified. Where relevant, recommendations have been developed to mitigate the potential environmental risks associated with each route. Following the consultation on the CG Strategy and Environmental Report, we will work with our transport stakeholders to develop an environmentally sustainable traffic management strategy for each GRN journey. Our aim will be to balance socio-economic considerations such as technical feasibility, cost and social impact with the potential environmental risks and vulnerabilities identified through this assessment. The overall approach to this assessment is summarised in Figure 2.2.

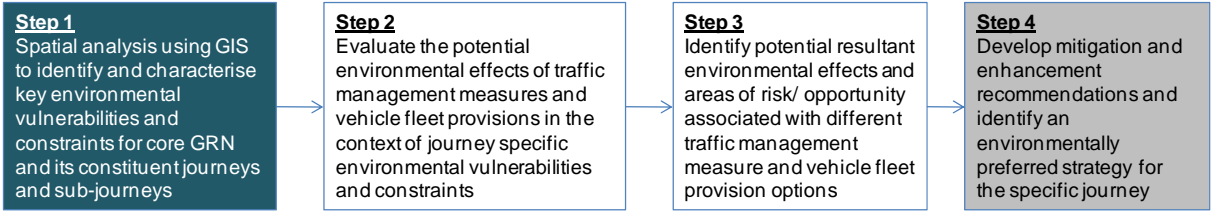


Figure 2.2 Approach to GRN traffic management/ vehicle fleet assessment

2.8.3 Assessment of the Transport Strategic Plan’s spectator and Games workforce provisions

In its current guise, the Transport Strategic Plan does not identify any specific strategy for spectator and Games workforce transport over and above the use of Glasgow’s existing and planned transport infrastructure and timetabled public transport service (i.e. the current strategy is a continuation of the baseline). Modelling work is currently underway to identify potential spectator and Games workforce transport demand on different days and for different routes. An assessment approach will be developed in due course as and when a clearer strategy for spectator and Games workforce transportation emerges.

2.9 Development of measures to monitor significant environmental effects

Monitoring is an integral part of SEA and the significant environmental effects of implementing the CG Strategy and Framework should be monitored to check the predictions made during the assessment, identify any unforeseen adverse effects and undertake any remedial action required. A proposed monitoring framework was developed during the SEA which identified the significant environmental effects predicted and potential indicators for monitoring them. Ideally, this SEA monitoring framework will be integrated with the monitoring requirements for delivery of the finalised CG Strategy and Framework and any other existing monitoring (e.g. that undertaken by the Council or environmental regulators) to avoid duplication of effort.

Monitoring is particularly crucial in this SEA given the phased nature of the CG Strategy and Framework's implementation. Given that the assessment has been undertaken in the context of a 2010 baseline when a number of provisions will be implemented in 2014 and beyond, maintaining an understanding of the changing environmental baseline will be a key task for Glasgow 2014 Ltd and their partners. Should significant changes have occurred in the environmental baseline by 2014, it may be prudent to revisit certain parts of the assessment to reevaluate the significance of environmental effects and make amendments to the mitigation/ enhancement strategy accordingly. These issues will be elaborated on in the SEA Post-adoption Statement following the outcomes of the consultation.

3. RELATIONSHIP WITH OTHER PLANS, PROGRAMMES, STRATEGIES AND ENVIRONMENTAL PROTECTION OBJECTIVES

A key requirement of the Environmental Assessment (Scotland) Act is the consideration of relationships between the plan, programme or strategy (PPS) under development and other relevant PPS and environmental protection objectives. This process has supported the identification of the policy and legislative framework within which the CG Strategy and Framework will sit. In addition, it helps the Responsible Authority (in this instance Glasgow 2014 Ltd) to account for any potential constraints and inconsistencies and take advantage of any synergies or opportunities. The approach taken to the consideration of other relevant PPS and environmental protection objectives is described in section 2.2.2.

3.1.1 Purpose of review

The review of relevant PPS, in conjunction with the collation of environmental baseline information has been crucial in the identification of key environmental problems, threats and opportunities in the area affected by the CG Strategy and Framework. Many of the local and regional level PPS reviewed (such as Glasgow's extant development plan – 'City Plan 2', Glasgow's Air Quality Action Plan and the Glasgow LBAP for example) include specific targets, actions and objectives for Glasgow's environment. The process of collating environmental baseline information has, by definition, identified the current state of the environment relevant to the development of the CG Strategy and Framework. Consideration of the environmental baseline in conjunction with environmental targets, actions and objectives from key PPS helps identify the environmental and legislative constraints within which the CG Strategy and Framework must operate. In addition, it identifies key environmental opportunities and strengths of the area which the ongoing development of the CG Strategy and Framework may capitalise and build on. Environmental constraints, vulnerabilities and opportunities are discussed more fully in Chapter 7. Where key environmental constraints, problems, opportunities and strengths have a spatial element, these have been mapped to help identify 'strategic sensitivities and opportunities' (see section 2.4.3).

Appendix E contains a full list of all relevant PPS considered as part of the SEA of the CG Strategy and Framework. Table 3.1 summarises the key PPS reviewed and the potential implications for the ongoing development of the CG Strategy and Framework and the SEA. Where relevant, it highlights key opportunities, synergies and constraints and key environmental protection objectives/ policy aspirations. These PPS are considered to be of most relevance to the scale of the CG Strategy and Framework and the scope of its objectives.

3.1.2 Key implications for the CG Strategy and Framework and SEA

As evident from Table 3.1 and Appendix E, there are a significant number of PPS and environmental protection objectives which may influence the development of the CG Strategy and Framework and *vice versa*. Some PPS will have more influence than others. For example City Plan 2 (Glasgow City Council, 2009) establishes Glasgow's land use and spatial planning framework within which the CG Strategy and Framework's spatial element will need to operate i.e. what type of development can be pursued and where. Other lower level planning frameworks such as the East End Local Development Strategy (EELDS) and South Dalmarnock Masterplan will also have a significant influence on the ongoing development of the CG Strategy and Framework and *vice versa*.

The importance of green network provision to the delivery of multiple policy objectives is addressed in several key Glasgow PPS including City Plan 2, the EELDS, the South Dalmarnock Masterplan and the

Clyde Gateway and Waterfront Green Network Strategies. Given that the much of the geographic area affected by the CG Strategy and Framework is of strategic importance in terms of green network development/ protection (e.g. Clyde Gateway/ Waterfront, Cathkin Braes etc) there are several PPS which will have a direct influence on the development of the CG Strategy and Framework and *vice versa* e.g. by supporting delivery of the objectives of these PPS. Key PPS in this regard include the EELDS' green network strategy and the Glasgow Local Biodiversity Action Plan (LBAP).

As discussed extensively elsewhere in this document, the CG Strategy and Framework's spatial strategy is largely predetermined by the locations of new and planned venue projects. Given this, key implications of the PPS review have focused on the identification of environmental baseline information and the identification of synergies/ overlaps that may constitute key environmental enhancement opportunities.

Table 3.1 Key PPS reviewed and implications for the CG Strategy and Framework and SEA

PPS Title	How the CG Strategy and Framework may respond and implications for the SEA	Key environmental protection objectives, targets, actions and principles
Cross-cutting PPS		
<p>City Plan 2 Glasgow City Council, 2009</p>	<ul style="list-style-type: none"> The CG Strategy and Framework and its proposed development activity should conform to the policies and land allocations within City Plan 2. The CG Strategy and Framework should work towards the achievement of City Plan 2's objectives and strategic intent and have regard to its guidance City Plan 2 establishes a number of policies with direct and indirect environmental implications. There are several areas of both synergy and conflict between what the CG Strategy and Framework aims to achieve and City Plan 2's environmental objectives. The SEA should have regard to these issues and help to ensure that the CG Strategy and Framework does not cause negative effects to the detriment of City Plan 2's environmental objectives. Crucially, the SEA should also support the identification of realistic opportunities for capitalising on any synergies and overlaps 	<ul style="list-style-type: none"> To ensure that new development contributes to improving the City's environment To ensure that areas of formal and informal open space are protected from inappropriate development To protect and enhance the character and landscape setting of the City and provide access to open spaces around Glasgow To maintain, protect and enhance national, regional and local sites of landscape, cultural or nature conservation importance To protect trees, woodlands and hedgerows from inappropriate development
<p>Clyde Gateway Business Plan Clyde Gateway Urban Regeneration Company, 2006</p>	<ul style="list-style-type: none"> The Business Plan sets out the URC's ambition and vision for the Clyde Gateway area which will be delivered through three strategic goals 1) sustainable place transformation; 2) increasing economic activity; and 3) developing community capacity. In addition, an expressed function of the URC is to provide a coordination and facilitation role in the delivery of Games related projects in the Clyde Gateway area, ensuring that these projects support the wider aims of URC's Business Plan and are linked to employability and community participation The ongoing development of the CG Strategy and Framework should have regard to the Business Plan's overarching strategy and also the scope and objectives of its constituent projects, particularly those within the geographic area broadly encompassed by the 'east cluster'. Within an overarching context of sustainability and the framework of environmental objectives considered in the SEA, the CG Strategy and Framework should work towards the delivery and enhancement of the Business Plan's socioeconomic regeneration objectives The SEA should take a view on the Business Plan's environmental objectives, commitments and projects and identify tangible opportunities where the CG Strategy and Framework can contribute to these e.g. through the enhancement of beneficial effects or incorporation of additional legacy projects 	<ul style="list-style-type: none"> Improve the quality of the built and physical environment Significantly reduce the levels of derelict and contaminated land Increase investment in physical infrastructure such as water and sewerage Work in partnership to create safe and attractive environments
Wildlife conservation & ecosystem services PPS		
Glasgow Local	<ul style="list-style-type: none"> The CG Strategy and Framework should consider how it may contribute to the 	The LBAP contains 9 Species Action Plans (SAPs)

PPS Title	How the CG Strategy and Framework may respond and implications for the SEA	Key environmental protection objectives, targets, actions and principles
Biodiversity Action Plan Glasgow LBAP Partnership, 2001	<p>achievement of relevant species/ habitat objectives and targets established in the LBAP's Habitat and Species Action Plans</p> <ul style="list-style-type: none"> The SEA should identify Glasgow LBAP species and habitats of relevance to the CG Strategy and Framework, the pressures and threats that face them and also opportunities they present for contributing towards the delivery of related objectives including socio-economic regeneration, environmental education and outdoor leisure and recreation The assessment should seek to identify potential environmental effects of the CG Strategy and Framework on key species/ habitats and ensure that detrimental effects are avoided or minimised and beneficial ones enhanced. Where relevant, enhancement recommendations in this context should work towards the delivery of wider objectives including green network development and environmental education Whilst LBAP habitats/ species and protected natural heritage sites may be a useful means of prioritising biodiversity orientated SEA enhancement recommendations, this should not preclude CG Strategy and Framework related development being used as a lever to enhance other non designated sites. The GCV Green Network Partnership's Integrated Habitat Network (IHN) model should be used to identify key opportunities for protecting and enhancing the integrity of habitat networks including those comprised of non-designated sites 	<p>and 11 Habitat Action Plans (HAPs), each of which contain a number of objectives, targets and actions for the individual species or habitat concerned. Where relevant, these have been considered elsewhere in this part of the Environmental Report within the context of cluster specific information. In addition, the LBAP has the following overarching objectives:</p> <ul style="list-style-type: none"> Show the surprising range of Glasgow's biological resource Explain why it is so important that we all try to help Glasgow's wildlife survive and thrive Suggest what can be done to ensure that our children, and their children, benefit from an even greater variety of plants and animals than we enjoy today
Water bodies & flooding PPS		
Scotland River Basin Management Plan SEPA, 2009	<ul style="list-style-type: none"> The Scottish River Basin Management Plan (RBMP) 2009-2015 was produced as one of the requirements of the Water Framework Directive (WFD). Preparation of the RBMP for the Scotland river basin district is the responsibility of SEPA as a requirement of the Water Environment and Water Services (Scotland) Act, which transposes the WFD into Scottish legislation The SEA provides an ideal opportunity to assess the full range of the Games' potential environmental effects on water related issues including pollution, flooding and flood risk and drainage. A key issue for the SEA to address is the identification of opportunities and options for Games related activity to contribute to the protection and enhancement of aquatic ecosystems and water quality. Of particular importance is the use of SuDS in new developments as well as retrofitting. This includes the development of strategic/ regional approaches to SuDS development. The SEA has also helped to identify the potential for 'added value' projects linked to the Games e.g. riverside improvement projects 	<ul style="list-style-type: none"> To protect and improve Scotland's water environment To achieve 'good' status in 98% of Scotland's water bodies by 2027 To bring about effective co-ordination of water environment policy and regulation across Europe Identify potential 'added value' projects that will enhance water quality/ aquaculture
River Clyde	<ul style="list-style-type: none"> The River Clyde Flood Management Strategy (RCFMS) was prepared to develop 	<ul style="list-style-type: none"> To ensure that new developments are protected

PPS Title	How the CG Strategy and Framework may respond and implications for the SEA	Key environmental protection objectives, targets, actions and principles
Flood Management Strategy Glasgow City Council, 2007	<p>a coordinated and strategic approach to development along the River Clyde</p> <ul style="list-style-type: none"> Given the proximity of some venues to areas of potential flood risk, the Commonwealth Games Strategy and Framework should have particular regard to the objectives and actions of the RCFMS There is the potential for the SEA to identify 'added value' type projects that would enhance riverbanks and amenity value which may also contribute to flood risk alleviation. It also provides an ideal opportunity to assess the adherence to flood management recommendations of new development and associated infrastructure to the RCFMS 	<p>from flood risk.</p> <ul style="list-style-type: none"> To ensure that all riverside development proposals incorporate direct flood defences To ensure developments and infrastructure meets the recommendations of the Strategy To explore the possibility of proposing 'added value' projects
Soils & soil quality PPS		
The Scottish Soil Framework Scottish Government, 2009	<ul style="list-style-type: none"> The Scottish Soil Framework (SSF) sets out the vision for soil protection in Scotland, and formally acknowledges the important services that soils provide to society The Commonwealth Games Strategy and Framework will need to demonstrate an understanding of how the construction, operation and future uses of the Games venues, infrastructure and Village could affect the soil environment, and demonstrate that actions have been put into place to ensure its protection and enhancement The SEA will consider the aspirations of the SSF, and highlight the importance of considering the soil environment where it is mentioned in associated PPS 	<ul style="list-style-type: none"> Promote the sustainable management and protection of soils consistent with the economic, social and environmental needs of Scotland Ensure that soils are recognised as a vital part of our economy, environment and heritage, to be safeguarded for existing and future generations in Scotland Soil is given an equal weighting to the other environmental topics
Climate change issues PPS		
Sustainable Glasgow Initiative Glasgow City Council and the University of Strathclyde, 2009	<ul style="list-style-type: none"> The Sustainable Glasgow partnership plans to make Glasgow one of Europe's most sustainable cities within 10 years. The aim is to improve the lifestyles and opportunities for Glasgow's people and businesses, enhance Glasgow's image as a leader in sustainable urban living and to deliver this in a way that is compatible with the development of a vibrant and growing city. Opportunities exist for Games related knowledge exchange with those wishing to invest in Glasgow, particularly around the provision of exemplars for sustainable design, construction and operation. Sustainable Glasgow can also support the aspirations of the Games, providing advice and assistance to the Organising Committee on sustainable matters Consideration would need to be made with regard to working towards minimising emissions, which is where developing a synergy between the Organising Committee and Sustainable Glasgow is key. The SEA can recommend how this might best be achieved 	<ul style="list-style-type: none"> Maintain and develop the current synergies that exist between the Games Organising Committee and Sustainable Glasgow Develop an ethos of knowledge exchange where best practise in sustainable design and construction is shared and promoted between the groups and with the wider public Work towards reducing as much as possible carbon emissions associated with increased air travel, traffic movement and construction activities
Air quality, noise & dust PPS		

PPS Title	How the CG Strategy and Framework may respond and implications for the SEA	Key environmental protection objectives, targets, actions and principles
<p>Air Quality Action Plan Glasgow City Council, 2009</p>	<ul style="list-style-type: none"> The AQAP delineates Glasgow's three AQMAs and outlines the key issues that have and continue to contribute to air quality issues in Glasgow. The plan outlines recent air quality monitoring data and highlights modelled predictions for 2010 which show several locations breaching objectives for NO₂ and PM₁₀ Given the scope and objectives of its provisions, the ongoing development of the CG Strategy and Framework should have particular regard to the actions and proposals within the AQAP. In particular, games-time and post-games transport management should consider current and emerging air quality vulnerabilities in key areas and, in line with AQAP actions, identify an appropriate strategy for the management of transport related air quality issues Where possible, careful consideration should be given to selection of appropriate games-time transport routes and development of sustainable transport options. These options should seek to avoid any aggravation of existing AQMA/ congestion 'hot-spot' issues and, where possible, deliver a legacy of improved air quality and air pollution management Air quality and air pollution will be key environmental issues for the SEA to address. In light of issues raised in the AQAP, development of the SEA framework (including objectives, assessment/ significance criteria and baseline) should have particular regard to air quality issues within the three AQMAs and the NO₂ and PM₁₀ 'vulnerable zones' 	<ul style="list-style-type: none"> To improve air quality in the three AQMAs Expansion of the programme of vehicle idling enforcement and increase in the provision of 'no idling' street signage Targeting dust and smoke emissions from construction sites Development of revised planning guidance on air quality Provision of real-time air quality information Establishment of low emissions zones
Landscape & the historic environment PPS		
<p>Scottish Planning Policy (SPP) Historic Environment Scottish Government, 2010</p>	<ul style="list-style-type: none"> The Historic Environment topic in the SPP should be taken into account when preparing development plans. It mirrors the aspirations of SHEP, and sets out recommendations for considering all elements of the historic environment, both designated and undesignated, during the preparation of development plans The CG Strategy and Framework should outline measures for protection, conservation and enhancement of the historic environment where there might be impacts from permanent and temporary structures, signs, public realm etc. The SEA should consider the potential effects of the CG Strategy and Framework on the historic environment, with particular attention paid to those elements of the Games close to Listed Buildings and within Conservation Areas 	<p>Aims The historic environment should be taken into account during the development of the Commonwealth Games Framework.</p>

4. WEST CLUSTER, ENVIRONMENTAL OBJECTIVES, BASELINE AND CONTEXT

4.1 Introduction

The location and extent of the area broadly encompassed by the west cluster is shown in Environmental Report Part A and also Appendices H and I. The following is a description of the current environment, and existing pressures on the environment that have been considered in the assessment.

The west cluster area has a diverse natural and built environment, ranging from the heavily modified, yet still historically significant area within which the SECC venue complex adjacent to the River Clyde sits; the nearby open parkland and River Kelvin, with the Victorian and later residential settlement around Kelvingrove and Kelvin Hall, and the historic suburbs in and around Scotstoun. All of these contribute towards providing this cluster with a wealth of natural and cultural heritage assets that need to be considered carefully. The following section considers the existing environment within the west cluster area.

The main roads that run through this cluster include Great Western Road, the Clydeside Expressway, Dumbarton Road, Argyle Street and Sauchiehall Street, all of which are popular vehicular thoroughfares between the city and the western suburbs.

The cluster has many public open spaces which are well used and valued. These include the large, planned parks such as Kelvingrove Park, Victoria Park, and the Botanic Gardens – as well as many smaller parks, allotments, sports fields and other recreational areas. There are four Conservation Areas, a large number of Category A and B Listed Buildings, and several sites designated for their natural heritage importance (e.g. Sites of Importance for Nature Conservation, Corridors of Landscape and Wildlife Importance, Sites of Special Landscape Importance and areas of ancient, long-established or semi-natural woodland).

There are a number of pressures within the area – particularly in relation to air and water quality. There is an Air Quality Management Area (AQMA) that takes in Byres Road and Dumbarton Road due to the high levels of NO₂ pollution associated with heavy traffic use. Water quality, both in terms of pollution and ecological potential, has been improving steadily over the last 10 years, however there are still parts of the Clyde and Kelvin rivers that have been identified as being poor, particularly within those areas affected by hydromorphological influences. Areas of potential flood risk have been identified directly to the south of the SECC venue complex; indeed the whole area has been significantly flooded in the past, most recently during the 2001 floods that affected a large part of the City.

Games-related activity will be concentrated around the venues, with the insertion of new public realm, the improvement of paths, and insertion of both temporary and permanent signage and lighting. There will also be temporary structures in and around the venues to accommodate media centres, retail and ticketing outlets, security structures and the associated facilities that are part and parcel of large-scale events. The SECC complex will be a busy area, with five events taking place, as well as an associated Commonwealth Games media hub. Kelvingrove, the venue for the bowls, will see the converting of the existing bowls greens to Games-standard, with the improvement of the current public realm. Parts of the venue at Scotstoun have already been redeveloped as a training venue for the London 2012 Olympics although additional squash courts will be constructed prior to the Games and Games-related signage and associated temporary facilities will be added during Games-time. The remainder of this Chapter outlines more detailed environmental baseline information across several SEA topics and sub-topics that are pertinent to the west cluster area and the Games related activity therein.

4.2 People, health and access

As outlined elsewhere in this report, while the average health of Glaswegians is improving, there remain areas of health inequality with many communities exhibiting health statistics that are worse than the Scottish average (e.g. the neighbourhoods encompassed by the east cluster area – see section 5.2.2). As highlighted in Appendix G section 2.2, health is influenced by a range of external factors including environmental and economic issues. Given that west cluster area encompasses some of Glasgow’s more affluent neighbourhoods, it is perhaps unsurprising that the health of its residents is better than that of other areas in the City. That said, the average male and female life expectancy of Glasgow west residents is lower than that of the Scottish average as are mortality rates from cancer, coronary heart disease and cerebrovascular disease.

4.2.1 Demographics

Population in the Glasgow west area reflects the general trend of stability exhibited in most other areas in Glasgow with the size of its overall population changing little in recent years. West Glasgow as a whole has an approximate population of 139,000 people comprising 14% children, 72% young and middle aged adults and 14% older people. There are currently around 70,000 households in west Glasgow of which over 46% are single adult occupancy reflecting the high percentage of young adults (those aged 16 – 44) in the area (GCPH, 2008). Proxy population statistics for the west cluster area as a whole and its communities are shown in Table 4.1. A key issue highlighted by Table 4.1 is the substantial size of the Glasgow west population encompassed by the west cluster area (more than twice that of the east cluster which has only 34,457 residents). This reflects the densely populated nature of the west of the City and also the fact that the already high levels of Games related activity are much more dispersed across the area (i.e. the west cluster area captures many more communities than the east cluster for example which is primarily focused around the two neighbourhoods of Parkhead/ Dalmarnock and Calton/ Bridgeton).

Table 4.1 West cluster proxy population statistics

(Source: GCPH, 2008)

Community Planning Partnership area	Neighbourhoods encompassed	Population
West cluster total population (proxy): 79,286		
Central and west	Yorkhill and Anderston	9,544
	Hillhead and Woodlands	19,850
	Broomhill and Partick West	11,219
	Hyndland, Dowanhill and Partick east	16,269
	Anniesland, Jordanhill and Whiteinch	9,725
West	Yoker and Scotstoun	12,679

Given the already high and relatively stable population in Glasgow west and its constituent neighbourhoods, there is currently no strategy to bring about any step change increase in population in the area (unlike the east cluster/ Clyde Gateway area for example). Despite this, City Plan 2 includes several strategies for the ‘Clyde Waterfront’ area of the wider Metropolitan Growth Corridor. These include a range of initiatives designed to improve the environment, drainage and flood defence infrastructure and access provision. Whilst there is no strategy as such for population increase, environmental and other improvements in the area over the lifetime of City Plan 2’s Clyde Waterfront strategy is likely to increase the attractiveness of the area to private sector investment in housing, retail, leisure etc which may contribute to relatively small scale increases in local population.

4.2.2 Health and the environmental determinants of health

This section outlines some of the key health issues in Glasgow west and, where relevant, summarises specific interrelationships between human health and the state of the environment in the area. There is a broad range of information available on health issues within Glasgow west e.g. Local Community Planning Partnership (CPP) Residents' Surveys, Glasgow Centre for Population Health's (GCPH) Community Health and Wellbeing Profile and the Commonwealth Games Health Impact Assessment (HIA). Given this and where appropriate, information here has been documented at the level of individual communities.

Community perceptions of environmental quality and environmental services

Two recent reports prepared on behalf of Glasgow Community Planning Partnership document the outcomes of residents' surveys undertaken for the West and Central and West Local Community Planning Partnership (CPP) areas. These two Local CPP areas encompass the main west cluster communities listed in Table 4.1 as shown on Figures 4.1 and 4.2. Residents involved in the survey were asked to comment on a range of issues in relation to 'cleansing and the environment' and 'quality of your neighbourhood'. Tables 4.2 to 4.5 summarise some of the key findings from these studies for the Local CPP areas as wholes.

Table 4.2 Summary findings from the West Local CPP 'Cleansing and Environment' survey

(Source: ODS Consulting, 2008)

Criteria	Summary statistics (note: emphasis added)			
	Serious problem	Problem	Not much of a problem	Not a problem at all
Litter in the streets	4%	13%	29%	48%
Untidy gardens	1%	7%	26%	57%
Untidy communal areas	2%	9%	20%	52%
Dirty stairs and closes	1%	5%	17%	47%
Graffiti	2%	9%	22%	60%
Fly tipping and dumping	2%	5%	15%	73%

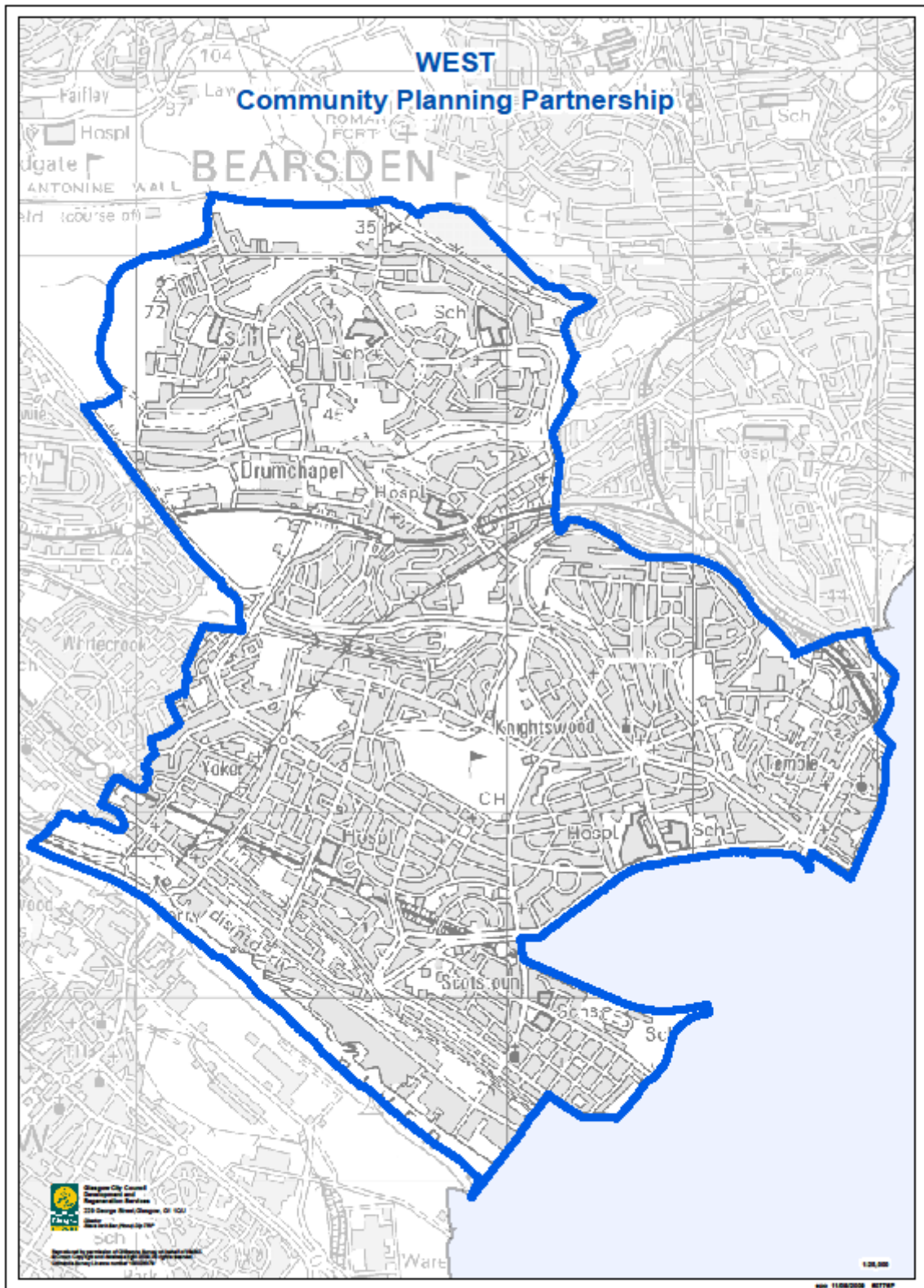


Figure 4.1 West Local CPP area

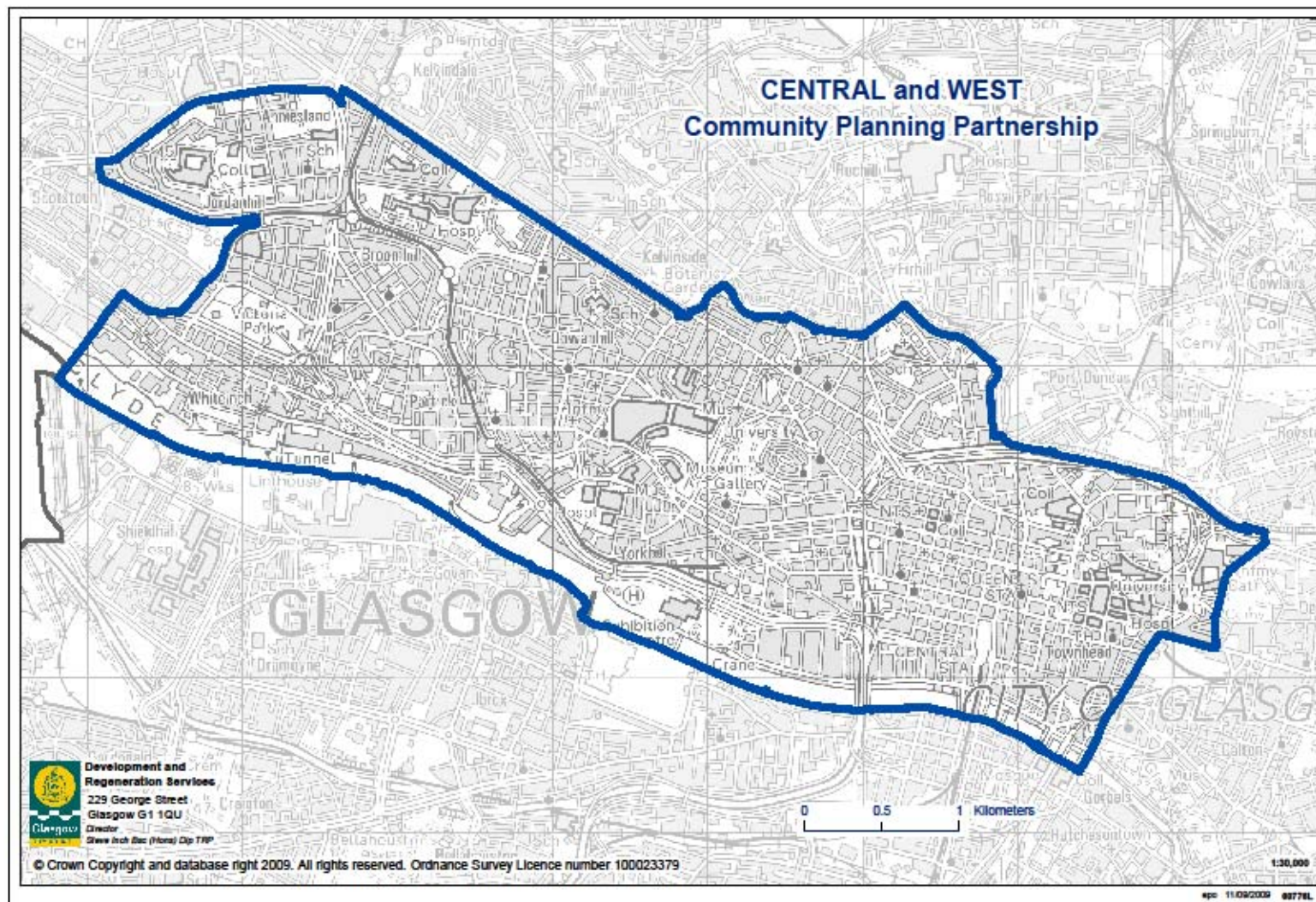


Figure 4.2 Central and West Local CPP area

Table 4.3 Summary findings from the Central and West Local CPP ‘Cleansing and Environment’ survey

(Source: ODS Consulting, 2008)

Criteria	Summary statistics (note: emphasis added)			
	Serious problem	Problem	Not much of a problem	Not a problem at all
Litter in the streets	4%	20%	20%	53%
Untidy gardens	1%	5%	16%	74%
Untidy communal areas	1%	8%	15%	72%
Dirty stairs and closes	1%	3%	13%	69%
Graffiti	3%	10%	21%	62%
Fly tipping and dumping	1%	4%	17%	75%

At the CPP level, a key trend observable from the data in Tables 4.2 and 4.3 is that the key cleansing and environment issue in the west cluster area is litter in the streets. This is recognised as being more of an issue in the Central and West Local CPP area. A not insignificant portion of residents in both Local CPP areas consider graffiti to be a problem issue also.

Table 4.4 Summary findings from the West Local CPP ‘Quality of your Neighbourhood’ survey

(Source: ODS Consulting, 2008)

Criteria	Summary statistics (note: emphasis added)			
	Very poor	Poor	Good	Very good
Attractive buildings	4%	6%	54%	18%
Attractive environment	4%	6%	54%	19%
Quiet and peaceful environment	4%	7%	51%	18%
Parks/ open spaces	6%	8%	20%	53%
Children’s play areas	9%	15%	41%	10%
Overall quality	4%	6%	59%	17%

As highlighted in Tables 4.4 and 4.5, West and Central and West Local CPP residents have very few issues with the overall quality of their neighbourhoods. The only significant issue was raised by West Local CPP residents where 15% consider the provision of children’s play areas in the area to be ‘poor’. As outlined below, the distinct lack of perceived issues with neighbourhood quality in the west cluster area is likely to be influenced by the strengths of several key environmental determinants of health.

Table 4.5 Summary findings from the Central/ West Local CPP ‘Quality of your Neighbourhood’ survey

(Source: ODS Consulting, 2008)

Criteria	Summary statistics (note: emphasis added)			
	Very poor	Poor	Good	Very good
Attractive buildings	1%	2%	52%	37%
Attractive environment	2%	3%	49%	37%
Quiet and peaceful environment	3%	4%	46%	35%
Parks/ open spaces	3%	7%	45%	33%
Children’s play areas	4%	8%	32%	27%
Overall quality	1%	2%	50%	37%

Health issues and potential relationships with perceived and actual environmental quality

The Glasgow Centre for Population Health (GCPH) Community Health and Wellbeing Profile programme identifies information for a range of health determinants (e.g. smoking levels, air quality, income etc) and health outcome indicators (e.g. life expectancy, hospitalisation etc). The CG Strategy and Framework has potential to influence a range of these issues, both positively and negatively, as highlighted in the Commonwealth Games HIA. Given the broadly environmental focus of SEA, information on health issues and their determinants has been collated only against those that are linked to environmental quality e.g. the link between respiratory problems and air quality.

Specific information on relevant environmental determinants of health has also been summarised but is covered extensively elsewhere in the cluster specific baseline e.g. air quality, greenspace provision, housing etc. In essence, information has only been collated against issues that can be considered within the scope of the SEA legal framework and good-practice. In turn, the SEA has made recommendations to inform the ongoing development of the CG Strategy and Framework regarding environmentally driven health issues it has potential to influence, both positively and negatively e.g. the potential for increased pressure on local transport infrastructure post-games due to increased demand to access new sports facilities and/ or through increased population in the area.

Table 4.6 outlines a range of key health outcome indicators that may be influenced by environmental factors for the Glasgow west area. The statistics show that whilst many of the indicators are sometimes significantly worse than the Scottish average, they are substantially better than other areas in the City (see section 5.2.2 for example). As shown on Figure 4.3, the area encompassed by the west cluster is well served with greenspace including some of Glasgow’s finest parks and gardens (e.g. Kelvingrove, the Botanic Gardens and Victoria Park) and a range of other amenity greenspace. In contrast to some other areas of the City, the west cluster area contains relatively little natural/ semi-natural greenspace with the majority of this resource located outwith its western boundary in Drumchapel. Perhaps due to the density of its built environment, the west cluster area is less well served than other parts of the City by core paths with two of the key routes in the area closely following the linear features of the Clyde and Kelvin rivers. Despite this, the populated, attractive and well lit nature of the streets in the area mean that residents have a multitude of safe and easy routes for accessing the area’s many greenspaces for recreation.

Given the above, a key issue for the SEA to consider is how the ongoing development of the CG Strategy and Framework can work towards the removal of barriers (both physical and psychological) to greenspace related outdoor activity and exercise in the west cluster area.

Figure 5.4 shows estimated annual mean concentrations of NO₂ in Glasgow and surrounding Local Authorities. In particular, the area with the highest annual average NO₂ concentrations (i.e. 40 µg m⁻³ and above which is above the current annual mean objective) encompasses several west cluster area communities. In addition, Byres and Dumbarton Roads are home to one of Glasgow's three AQMAs designated for NO₂. NO₂ is associated with adverse effects on human health and at high concentrations can cause inflammation of the airways and enhance the response to allergens in sensitive individuals. Long term exposure may affect lung function and respiratory symptoms (Defra, 2007). Whilst there is no data available on the impact of poor air quality on the health of west cluster residents, air quality is a key environmental determinant of health. Given this, the CG Strategy and Framework should work towards the alleviation of air quality issues in the west cluster area and, as a minimum, ensure that it does not contribute to any further degradation of air quality and associated health impacts.

Table 4.6 Glasgow west, key health outcome indicators that may be influenced by environmental factors

(Source: GCPH, 2008)

Indicator	West Glasgow	
	Local data	Position relative to Scottish average
Population and demographics		
Male life expectancy	70.8 years	Lower (4%)
Female life expectancy	77.7 years	Lower (2%)
Single adult households	32,273 (46.3%)	Higher (8%)
Mortality		
Deaths all ages ³	7,988	Higher (21%)
Coronary heart disease deaths in under 75s	613	Higher (34%)
Cerebrovascular disease deaths in under 75s	201	Higher (37%)
Mental health and function		
Self assessed health classified as 'not good'	18,337 (13.7%)	Higher (35%)
Patients prescribed drugs for anxiety/depression	15,643 (10.1%)	Higher (24%)
Housing and transport		
Overcrowding ⁴	15,026 (23.1%)	Higher (96%)
Travelling to work by foot, bike or public transport	51,094 (64.4%)	Higher (44%)

4.2.3 Access

As outlined above, the health of west cluster residents, whilst better than those of other areas in the City, is significantly worse than the Scottish average. This is particularly true of coronary heart disease and cerebrovascular disease. The risk of both these diseases can be reduced through the uptake of regular exercise including outdoor exercise such as walking. A key issue affecting the uptake of outdoor recreation is the provision of access routes to areas of amenity greenspace and the suitability of such routes as a recreational resource in their own right (e.g. for running, walking, cycling etc). This section outlines the current and potential future situation in relation to accessibility via the west cluster's network of paths.

³ All mortality statistics have been calculated as annual averages over a five year period

⁴ Percentage of all households considered to be overcrowded – relates the actual number of rooms in a household to the number of rooms 'required' by the members of the household (based on the relationships between them and their ages)

The west cluster area includes several existing core paths, most of which follow linear features such as the Clyde and Kelvin rivers, the Forth and Clyde Canal and some main transport routes such as Woodlands Road. The area is well served by existing cycle routes that include bus lanes and 'safer routes to school'. There are a limited number of aspirational core paths within the west cluster area as most of these potential routes fall within the Firhill and Ruchill areas which are outwith the core west cluster area. In contrast to core paths provision in the east cluster area (see section 5.2.3), the west cluster has a limited number of paths linking residential/ community areas with the key linear paths that provide access to the City centre and other parts of the City (e.g. the Clyde and Kelvin Walkways). These types of 'link' paths are most prevalent in the Scotstoun, Jordanhill and Whiteinch areas.

A recent report commissioned by the GCV Green Network described the provision for community and recreational access to the Clyde corridor. The study splits the Clyde corridor into several discrete sections, three of which fall within the broad area encompassed by the west cluster. In marked contrast to other sections of the corridor (e.g. the Clyde Gateway), relatively few barriers to access and/ or problems were identified in relation to the sections falling within the west cluster. Crucially, most sections were reported as being well signed and lit. This is in marked contrast to the Clyde Gateway section where despite the relative ease of access afforded by the Clyde Walkway, it is underused as a key route for pedestrian/ cycle access to the city centre and other areas due to concerns about safety and anti-social behaviour.

One potential barrier to west cluster Clyde corridor access is the current lack of significant public or semi-public greenspace (e.g. around the relatively new housing development at Glasgow Harbour) and/ or permanent communities close to the waterfront (e.g. SECC and Pacific Quay). Furthermore, the Clydeside Expressway and railway immediately north of the river constitute a major barrier to access with only a limited number of crossing points. The overall effect is one of relatively poor integration between the various west cluster residential/ community areas and the Clyde Walkway itself. Communities use open spaces that are detached from the riverside and are unlikely to see the waterfront/ walkway as a leisure resource given the widespread inaccessibility and safety issues in certain locations (AECOM, 2010).

4.3 Wildlife conservation & ecosystem services

Despite its broadly urban context, the west cluster area has a rich natural heritage/ biodiversity resource. Particularly important resources are the River Kelvin and its associated riparian habitat and the area's many parks and gardens. There are a broad range of important green network opportunities in the area that the ongoing development of the CG Strategy and Framework should consider e.g. improved habitat integration for biodiversity enhancement and development/ enhancement of green infrastructure for sustainable drainage purposes.

4.3.1 Statutory and non-statutory conservation designations

Statutory conservation designations are used to ensure the conservation and enhancement of natural heritage sites. Protection is afforded through international, European and national legislation. In addition, planning policy protects locally important sites. The west cluster area contains one nationally designated site at Victoria Park – Fossil Grove SSSI. SSSIs are afforded national level protection for their conservation importance under the Nature Conservation (Scotland) Act (2004). SSSIs represent the best of Scotland's natural heritage and are regarded as being special for their plants, animals or habitats, their rocks or landforms, or a combination of such natural features (SNH, 2008). The SSSI at Victoria Park is a small well managed geological site currently described as in a 'favourable maintained' condition.

Glasgow City Council also designates Sites of Special Landscape Importance (SSLIs). These are protected through City Plan 2 policy ENV 7 which aims to maintain, protect and enhance national, regional and local sites of landscape, cultural or nature conservation importance. Proposed development that may affect a SSLI must be able to demonstrate how it will enhance the specific landscape characteristics of a given site. Given that many SSLIs are also statutory parks and gardens, development on or adjacent to these sites is also constrained by national level legislation and planning policy. There are many SSLIs in the west cluster area, the most significant of which are outlined in Table 4.7.

Local Authorities may designate a Site of Importance for Nature Conservation (SINCs) when a site is deemed to be of locally important conservation interest. City Plan 2 defines SINCs of 'city-wide' (C-SINCs) and 'local' importance (L-SINCs), both of which are a material consideration in determining planning applications. There are two C-SINCs and one L-SINC in the west cluster area as depicted in Appendix H and outlined in Table 4.7.

SINCs are afforded statutory protection against inappropriate development through the planning system. Policy ENV 7 in City Plan 2 affords city-wide and local SINCs protection against inappropriate development. Greater protection is afforded to city-wide SINCs and, in general, ENV 7 aims to *"maintain, protect and enhance national, regional and local sites of landscape, cultural or nature conservation importance"* (GCC, 2009). The ongoing development of the CG Strategy and Framework should have regard to the potential for effects on west cluster SINCs, contribute to the enhancement of locally important habitats and in any event, have regard for Policy ENV 7 in City Plan 2.

Trees, gardens and woodland in Glasgow are recognised for their ability to enrich the lives of residents and also the quality and image of the City given that these types of land use constitute an important part of the City's setting. Many efforts are and have been made to consolidate and extend woodland provision in Glasgow as a key part of the City's wider green network provision. Trees, gardens and woodland are protected through local planning policy which seeks to ensure that:

"..development should not cause the loss of, or serious damage to, trees, woodlands or hedgerows, which are covered by an existing tree preservation order (TPO), are on Council owned land, are of significant ecological, recreational, historical, shelter or landscape value or are in a conservation area" (GCC, 2009)

In addition, areas of ancient, long-established and semi-natural woodland in Glasgow are recognised as being particularly important due to their provenance and composition of predominantly native species. The vast majority of this type of woodland in Glasgow is broad leaved/ mixed woodland and wet woodland habitat, both of which have had a Habitat Action Plan prepared through Glasgow's LBAP process. The west cluster area contains two key areas of ancient, long-established and semi-natural woodland as outlined in Table 4.7.

Given the above, it is clear that there is a strong legislative and policy framework promoting the protection and enhancement of sites designated for their conservation importance. The west cluster area contains a range of such sites, the vast majority of which are protected through local planning policy as opposed to national level legislation. A key issue for the SEA to address is to ensure that any conservation designation orientated environmental risk is accounted for and informs the development of the CG Strategy and Framework going forward. In addition, opportunities should be sought for enhancing green links between the various west cluster sites to improve the overall provision of green network. This is discussed further in section 4.3.3.

Table 4.7 West cluster conservation designations

Site	Area and distance from key Games venue(s)	Additional information
C-SINCs and L-SINCs		
River Kelvin (C-SINC)	The River Kelvin is adjacent to the Kelvin Grove Bowling Greens and Kelvin Hall Sports Arena	N/A
River Clyde (C-SINC)	The River Clyde is adjacent to the SECC, Clyde Auditorium and Scottish National Arena	N/A
Festival Park (L-SINC)	Festival Park is approximately 500m due south of the SECC site on the south side of the River Clyde	N/A
SSLI		
Kelvingrove Park	The Kelvingrove Park SSLI extends over 34 Ha and is immediately adjacent to the Kelvin Grove Bowling Greens	The Park is located north of the River Clyde about 1.5 miles west of the city centre. Its design and setting on the banks of the River Kelvin enhance and compliment the many magnificent buildings which surround it
Park Circus	Park Circus SSLI lies approximately 470m north-west of the Kelvin Grove Bowling Greens site	Described as a communal/ leisure garden
Woodland Terrace	The Woodlands Terrace SSLI lies approximately 420m to the east of the Kelvin Grove Bowling Greens site	Described as a communal/ leisure garden
Victoria Park	Victoria Park SSLI has an area of 20 Ha and lies approximately 380m to the south east of Scotstoun Leisure Centre	The park is located in the Scotstoun area in the West End of Glasgow. The park includes an extensive range of formal floral displays, carpet bedding and hollies.
Jordanhill Campus	Jordanhill Campus SSLI lies approximately 150m to the north of Scotstoun Leisure Centre	N/A
Ancient, long-established and semi-natural woodland		
Jordanhill Woods	This woodland has an area of 1.65 Ha and lies approximately 350m to the north of Scotstoun Leisure Centre	N/A
Kelvingrove Woods	This woodland has an area of 3.87Ha occupying a site between the University of Glasgow and the River Kelvin at Gilmorehill. This is approximately 110m north of the Kelvin Grove Bowling Green complex	N/A

4.3.2 LBAP Habitats and species

The Clyde and Kelvin Rivers are key habitats under the LBAP's 'Rivers and Streams' local Habitat Action Plan (HAP). Whilst there is no data available for the specific stretches of the Clyde and Kelvin running through the west cluster, otters (which are covered by a Glasgow LBAP local Species Action Plan – SAP) have been recently recorded on all of Glasgow's major water courses. In addition, the west cluster area is home to two of the main locations covered by the Glasgow LBAP's HAP for 'Open Standing Water' at Victoria and Kelvingrove parks. Table 4.8 summarises some of the key pressures and threats affecting river/ open standing water habitats and otters in Glasgow and outlines some of the LBAP actions supporting their protection and recovery.

Table 4.8 Pressures and threats affecting key Glasgow LBAP habitats and species

(Source: Glasgow LBAP, 2008)

Key pressures and threats	Relevant actions and environmental protection objectives
Local Habitat Action Plans (HAPs)	
Rivers and streams	
<p><u>Pollution:</u></p> <ul style="list-style-type: none"> Contaminated land – rainwater leaches toxic chemicals such as chromium from the soil into watercourses Sewage and current industrial discharges Pollution from diffuse sources such as hard standings in cities and road drainage <p><u>Engineering:</u></p> <p>As land values in Glasgow remain high, there is a desire to minimise space taken by river corridors. Development on floodplains can increase the risk of flooding as the rate of storm water run-off is increased, and less land is available to store the floodwater. This may lead to policies for further hard engineering of river channels for flood defence and associated habitat loss</p> <p><u>Loss of habitat:</u></p> <ul style="list-style-type: none"> Introduction of invasive non-native fish species Introduction of invasive non-native plant species - Giant Hogweed, Japanese Knotweed and Himalayan Balsam are colonising many riverbanks in Glasgow. These plants can reduce riverbank biodiversity and upset the natural balance of species 	<p><u>Objectives:</u></p> <ul style="list-style-type: none"> Prevent deterioration of water quality in the city's rivers Ensure new development, where possible, does not increase the risk of flooding in sensitive areas Maximise the potential for wildlife habitat Improve the public perception of rivers <p><u>Actions:</u></p> <ul style="list-style-type: none"> Aim to use natural materials and liaise with neighbouring catchments when planning engineering changes to riverbanks Parklands: use management techniques to encourage the establishment of appropriate native plants along riverbanks Develop a strategy to manage riverbank vegetation to improve naturalness and biodiversity Promote awareness of rivers and streams at wildlife events and visitor centres Promote anti - litter campaigns and council waste collection facilities
Standing open water	
<p>The main threat to standing waters in Glasgow is loss of biodiversity caused by increasing levels of nutrients. Additional pressures and threats include:</p> <ul style="list-style-type: none"> Development pressure can result in the total destruction of small ponds and alter the hydrology of larger water bodies 	<p><u>Objectives:</u></p> <ul style="list-style-type: none"> Promote optimal water quality to support desirable biological interest Increase area of open water and habitat quality Promote awareness and understanding of open water and aquatic habitat conservation

Key pressures and threats	Relevant actions and environmental protection objectives
<ul style="list-style-type: none"> • Eutrophication caused by excessive nutrient input from sewage effluent, accidental spills (e.g. slurry) and, at smaller sites, large wildfowl populations and people feeding ducks • Toxicity from pesticides, organic matter or heavy metals discharged into feeder watercourses • Reinforcement of banks reducing bank side vegetation • Neglect at park ponds or health and safety issues • Use of herbicides to control vegetation at recreational water bodies 	<p>Actions:</p> <ul style="list-style-type: none"> • Where ponds form part of a Sustainable Urban Drainage System (SuDS) ensure management plans promote biodiversity • Encourage the creation of new ponds and wetlands at urban, agricultural or other open space land make use of SuDS scheme • Encourage owners of heavily managed ponds to increase semi-natural vegetation • Encourage public and community involvement in pond management and creation work • Erect signs and information points to promote awareness and appreciation
Local Species Action Plans (SAPs)	
Otters	
<p>Within Glasgow, otters have recently been recorded on all major watercourses including the Clyde. Current pressures and threats include:</p> <ul style="list-style-type: none"> • Pollution of watercourses – toxic chemicals, oil spills and acidification etc • Insufficient food availability, associated with poor water quality • Barriers to dispersal, such as culverts • Reduction in breeding success through disturbance at breeding sites • Impoverished bankside habitat features needed for breeding and resting • Direct loss of habitat due to inappropriate development/ engineering • Incidental mortality such as road deaths 	<p>Objectives:</p> <ul style="list-style-type: none"> • Establish and protect current distribution and status of all populations in Glasgow • Expand existing distribution of Otters in Glasgow • Raise public awareness of Otters • Raise awareness of Otters and habitat requirements with landowners, angling clubs and other interested organisations <p>Actions:</p> <ul style="list-style-type: none"> • Recommend that all wetland areas and watercourses are surveyed before any development or maintenance works to ensure minimisation of damage to habitats • Ensure all areas involved in flood alleviation works are surveyed before work starts and management guidelines are followed • Advise owners and seek to secure management agreements at known Otter sites • Liaise with neighbouring Councils and landowners at nearby sites to encourage species movement and viable local populations • Assess management of existing sites • Create new habitats at or adjacent to new sites where practical

4.3.3 Green network

As outlined in section 4.3.1 and Table 4.7, the west cluster area contains a considerable number of natural heritage sites that are designated and protected through local planning policy. In line with City Plan 2's approach to green network strategy, these sites also constitute a key part of Glasgow's green network. Over and above these conservation designations, a substantial portion of Glasgow's green network is made up of

'green corridors' (including rivers, streams, canals, hedgerows, trees, railway lines, motorways and trunk roads) and other non-designated sites such as parks, woodlands, allotments and golf courses. Figure 4.3 shows greenspace provision in the GCPH 'Glasgow West' area.

Each type of green network site has different strengths in terms of the range of policy objectives its use and management can support. For example, parks and gardens, whilst having limited biodiversity interest, can play a key role supporting healthy lifestyle and outdoor recreation objectives. Conversely, a well managed local SINC may be of more use in terms of biodiversity protection and enhancement and environmental education. A key approach adopted by City Plan 2, the City's various local development frameworks and indeed the Clyde Gateway and Waterfront Green Network Strategies is the development and enhancement of 'multi-functional' green network sites that can support the objectives of several key policy areas.

City Plan 2 establishes the overall policy context for green network provision including the stipulation that any development proposed within or adjacent to an area defined as being part of the green network will have to demonstrate that it has taken account of the need to maintain and enhance connectivity in relation to wildlife, landscape and access as appropriate to the site and its surroundings (GCC, 2009). Given this, it is likely that green network provision in Glasgow will improve over City Plan 2's lifetime – as more development proposals come forward, implementation of green network policy should ensure that green network provision is enhanced in line with the scale of proposed development. There are also key synergies between green network provision and flooding/ drainage issues. The implications of and potential opportunities raised by these synergies are discussed in more detail in the context of the environmental baseline and objectives of relevance to the east cluster (see section 5.3.3).

As evident from Table 4.7 and Figure 4.3, a key green network issue in the west cluster area is the prevalence of landscape/ park orientated green network sites (i.e. Sites of Special Landscape Importance – SSLI). Whilst these sites represent a fantastic resource in terms of recreational and cultural facilities, they are of limited biodiversity interest. A recent study commissioned by the GCV Green Network⁵ reviewed existing biodiversity and arrangements for its management in the Clyde corridor area to identify current issues and develop a suite of proposals to conserve and enhance biodiversity value in the area. In addition to identifying a broad range of recommendations across such issues as urban biodiversity, invasive alien species and river restoration, a number of sites were identified, on the basis of Phase 1 habitat survey and a specialist workshop, that have 'potential biodiversity interest' or represent a 'restoration opportunity'. Sites considered as having potential biodiversity interest may represent a key enhancement opportunity for Games related activity. Key sites in this regard include:

- Kelvingrove Park;
- The riparian habitat on the banks of the River Kelvin from the bridge at Eldon Street to its confluence with the Clyde;
- Victoria Park; and
- A disused railway line immediately east of Scotstoun Leisure Centre.

Where appropriate, the assessment has supported the identification of enhancement opportunities whereby delivery of Games related activities can enhance the biodiversity interest at these key sites. The assessment has also been informed by the provisions/ proposals within the Clyde Waterfront Green Network Strategy.

⁵ The River Clyde Biodiversity Project (EnviroCentre, 2008).

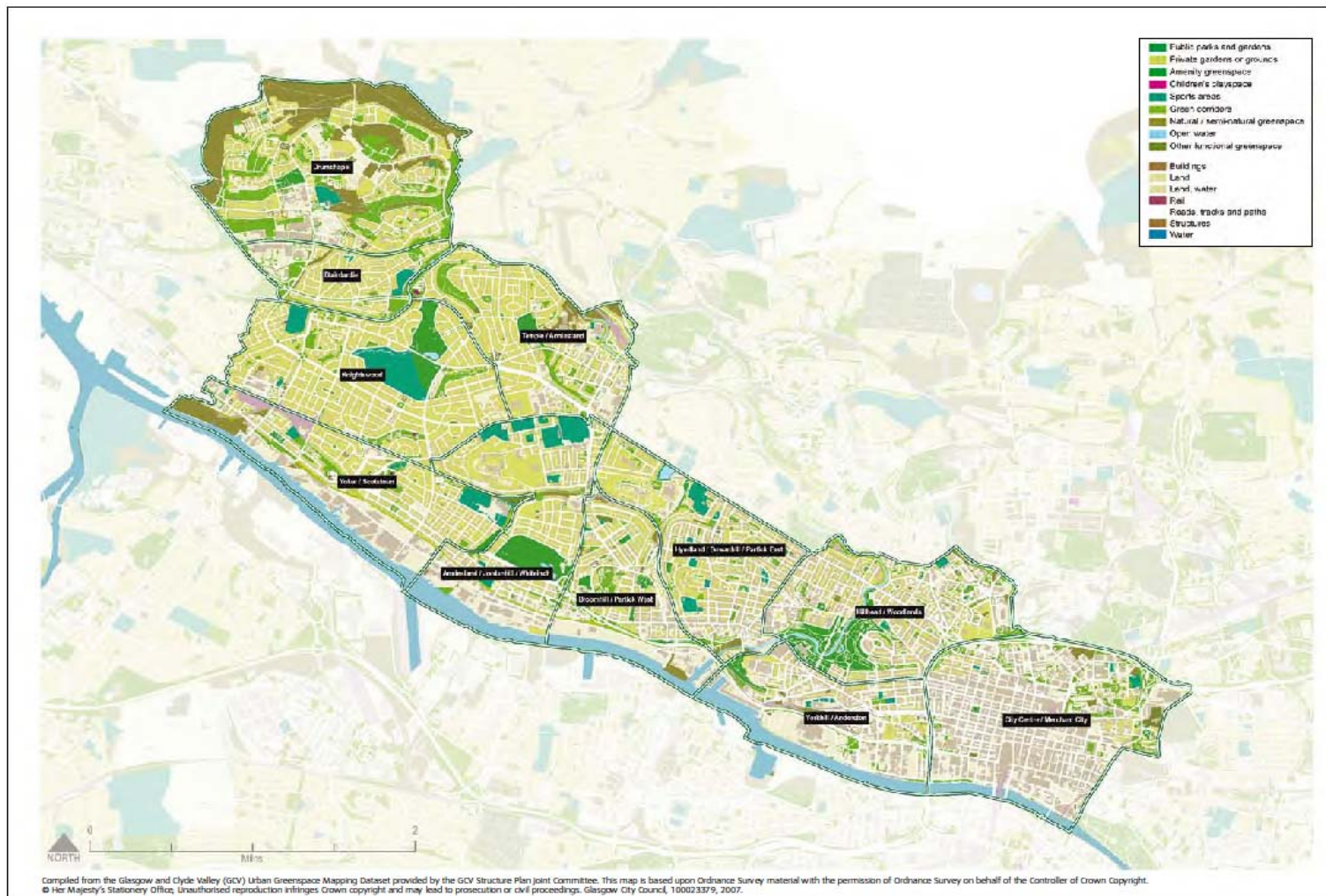


Figure 4.3 West Glasgow greenspace provision

(Source: GCPH, 2008)

4.4 Water bodies & flooding

Water quality in the west cluster area, both from a point source pollution and ecological perspective, has been improving year on year. With the exception of the area around the SECC flood risk is not as much of an issue as it is elsewhere in the City – this is down mainly to the fact that the River Kelvin runs through a valley for most of its extent here, and the settlement areas are on relatively high ground compared with elsewhere in the City. The SECC venue complex lies adjacent to the Clyde which is under tidal rather than fluvial influence at this location. This means that there is a higher risk for flooding here, particularly during times of high rainfall with accompanying high tides.

Particular potential issues associated with Games-related activity and water has therefore been identified around the SECC, given its proximity to the River Clyde, the extent of Games-related activity and the fact that it has flooded in the past. It is not thought that activities associated with the venues at Scotstoun, Kelvin Hall and Kelvingrove will have significant effects on water quality given that there will not be significant development works; however given that Glasgow's current surface drainage system operates at capacity during times of high rainfall there could be issues associated with localised flooding within all areas of the cluster.

4.4.1 Local plans, policies and strategies

The improvement in water quality across Scotland can be attributed mainly to the *Water Framework Directive (WFD)* and the subsequent *Scotland River Basin Management Plan* that was developed by SEPA in response to the requirements of the WFD. At a local level the City Plan 2 has a number of environmental policies and objectives that are concerned primarily with the water environment and flood risk. These are outlined below:

- **ENV17: Protecting the water environment:** to ensure new development does not have an adverse impact on the water environment by preventing the deterioration of aquatic ecosystems and enhancing their quality, including groundwater, promoting sustainable water use, reducing pollution and mitigating against the impact of severe weather events;
- **ENV4: Sustainable drainage systems (SuDS):** To ensure satisfactory sustainable measures are provided for the management and safe disposal of surface water run-off; and
- **ENV5: Flood prevention and land drainage:** to safeguard development from the risk of flooding and to ensure new development does not have an adverse impact on the water environment, does not materially increase the probability of flooding elsewhere and does not interfere detrimentally with the storage capacity of any functional flood plan or associated water flows.

4.4.2 Water quality

River Clyde

The Clyde runs along the southern extent of the cluster, and is the largest body of open water in the area. This part of the Clyde has been heavily utilised in the past and retains very little of its natural appearance, having been completely remodelled and dredged in order to accommodate large shipping. The overall quality of the Clyde varies from class B to C (fair to poor) within the area, up to the tidal weir by Glasgow Green. SEPA have classified this water body as having an overall status of Moderate Ecological Potential with Medium Confidence in 2008 with overall ecological status of Bad and overall chemical status of Pass.

Environmental objectives have been set by SEPA for this water body over future river basin planning cycles in order that sustainable improvements to its status can be made over time, or alternatively that no deterioration in status occurs, unless caused by a new activity providing significant specified benefits to society or the wider environment. For this water body SEPA have set the overall environmental objectives for the first, second and third River Basin Management Planning cycles as:

- 2008: Moderate ecological potential;
- 2015: Moderate;
- 2021: Moderate; and
- 2027: Good.

River Kelvin

This is an important recreational river, having the Kelvin Walkway in its lower reaches, and being a feature of Kelvingrove Park. The main water quality problems are sewage pollution and general street run-off, but the river still manages to be in good condition at Balmuldy Bridge, and fair condition at Kelvingrove. In 1995, salmon were reported in the Kelvin for the first time in over 100 years. SEPA have classified this water body as having an overall status of Poor Ecological Potential with Medium Confidence in 2008 with overall ecological status of Poor and overall chemical status of Fail.

Environmental objectives have been set by SEPA for this water body over future river basin planning cycles in order that sustainable improvements to its status can be made over time, or alternatively that no deterioration in status occurs, unless caused by a new activity providing significant specified benefits to society or the wider environment. For this water body SEPA have set the overall environmental objectives for the first, second and third River Basin Management Planning cycles as:

- 2008: Poor ecological potential;
- 2015: Poor;
- 2021: Poor; and
- 2027: Good.

Groundwater

Groundwater within Glasgow is characterised as a single body, so the following description is relevant to all the clusters covered by the assessment. Groundwater in Glasgow is provided by the Clydebank and Kirkintilloch bedrock and localised sand and gravel aquifers, of which the quality is assessed by SEPA as being Poor (SEPA, 2009). There are a number of significant pressures on the water environment in the Glasgow City area (described in subsequent sub-sections); in particular those caused by Glasgow's industrial past which has left a legacy of potentially contaminated land; and those caused by current pressures such as drainage, transport and development within the City.

Development of the Commonwealth Games Strategy and Framework should consider the extent to which it may contribute to these and how these pressures may negatively affect groundwater quality. Potential positive effects will also be highlighted, in particular where contaminated land will be remediated, and where SuDS will reduce the amount of contaminants entering the ground

4.4.3 Water pollution

Water pollution data (both point and diffuse source) for each water body outlined above is available using SEPA's River Basin Planning interactive map⁶ which has been consulted extensively during this SEA. A summary of relevant information from the interactive map tool is provided in Appendix J. For all water bodies considered in the assessment, the majority of pollutants found are related to point and diffuse pollution related to sewage disposal, and consisting particularly of phosphorus and ammonia. As such, the issues described here are of relevance to the South and East clusters also. Given the location of all the water bodies in an urban environment this is unsurprising, and with the improvement to drainage and sewage treatment that will be occurring in Glasgow during the next 10 years there will likely be an improvement in water quality.

4.4.4 Flood risk

Up to the 19th century, the River Clyde had a long history of flooding in central Glasgow. Extensive river engineering works carried out from the mid-18th century onwards, including the widening and deepening of the river, the construction of quay walls and raising of adjacent land, have meant the centre of Glasgow has not been affected by overbank flooding within the last century (Halcrow – Fairhurst, 2005). Flooding along the Clyde can be both fluvial and tidal due to the location of Glasgow along the transition reach between tidal and fluvial influences. There have been several serious instances of flooding in Renfrew and Dumbarton in 1991 when an extreme high tide coincided with a moderately high river flow

Glasgow is at the upper limit of the tides flowing from the Firth of Clyde. The height of the tide varies with the positions of the moon and sun but can be greatly increased by tidal surge. Severe weather conditions to the south and west of the Firth of Clyde can cause a surge that runs up the Firth and upstream as far as Glasgow. When this happens at the same time as a high tide, the water level rises above the levels of the quay walls in the west and city centre. This is a major threat to the city, and has occurred in the recent past in 2002. This risk is often described in terms of flood return period as a 1 in 200 year event. This does not mean that it will only happen once in a hundred years but mean that there is a 1 in 200 chance of it happening in each and every year.

Within the west end the main flood risk areas are concentrated around the Clyde, as the Kelvin runs through a deep valley along the majority of its length. Those areas identified as being particularly at risk from flooding are (North Bank): Lancefield Quay, Finnieston Quay, Scottish Exhibition and Conference Centre, Yorkhill Quay, areas around the West Basin and River Kelvin confluence, Meadowside Quay, Scotstoun Shipyard and Yoker Road.

4.4.5 Hydromorphology

The Rivers Kelvin and Clyde have been subjected to significant alteration during the past 200 years. The Clyde here has been completely altered through its past use for shipbuilding and trading. The mouth of the Kelvin has also been subjected to significant alteration in association with works on the Clyde. Further upriver there has been some alterations work, particularly in the area around the Woodlands flint mill and within Kelvingrove Park.

⁶ See http://www.sepa.org.uk/water/river_basin_planning.aspx

4.5 Air quality, noise & dust

4.5.1 Air quality

The west cluster area contains one of Glasgow's three Air Quality Management Area (AQMA) at Byres Road and Dumbarton (see Figure 4.3). The air pollutant of concern is NO₂. As shown in Table 4.9, the 2009 Air Quality Action Plan (AQAP) predicted exceedences of the 2005 objective for NO₂ at the Byres Road monitoring location.

Table 4.9 2006 and 2010 predicted NO₂ levels for the Byres Road and Dumbarton Road AQMA

Note: predicted exceedences are highlighted in bold red
(Source: Glasgow City Council, 2009)

Byres Road/ Dumbarton Road AQMA monitoring locations	NO ₂ µg m ⁻³ (2005 objective level: 40 µg m ⁻³ annual mean)	
	2006	2010 Predicted
Byres Road	52	46
Dumbarton Road	39	34
Lawrence Street	39	34
Cooperswell Street	34	30

The area encompassed by the Byres Road and Dumbarton Road AQMA is depicted on Figure 4.3. This area lies in the heart of Glasgow's west end and is characterised by a mixture of residential and commercial properties, most of which are housed in tenement buildings. The area extends from the junction of Byres Road and Great Western Road in the north east to Dumbarton Road as far as Thornwood Drive in the south east. There are a number of Commonwealth Games venues in the vicinity of the Byres Road and Dumbarton Road AQMA (e.g. Kelvingrove Bowling Greens, Scotstoun Squash Centre etc). As such, the potential effects on air quality in the area have been considered carefully with a view to minimising potential negative effects in the first instance (e.g. increased games-time and post-games traffic) and, failing that, identifying sustainable mitigation opportunities.

Outwith the existing Byres Road and Dumbarton Road AQMA, NO₂ monitoring data from elsewhere in the west cluster area indicates that there are potentially a number of other emerging NO₂ related air quality issues. For the purposes of the Commonwealth Games SEA (and in recognition of their potential strategic importance as potential games-time routes) five additional monitoring locations have been highlighted for consideration (see Table 4.10). Although these sites may arguably be considered as emerging NO₂ vulnerable locations, it should be noted that the majority of monitoring locations outwith the Byres Road and Dumbarton Road AQMA exhibits compliance with the annual mean objective for NO₂.

In addition, PM₁₀ monitoring data from elsewhere in the west cluster area highlights the potential for an emerging PM₁₀ related air quality issue. GCC's 2009 Air Quality Updating and Screening Report identifies Broomhill as a key risk area given the prediction that this site will fail to meet the revised 2010 annual mean objective. In line with statutory requirements, GCC are proposing to move forward to a Detailed Assessment for PM₁₀.

Table 4.10 NO₂ vulnerable locations in the west cluster area

Note: exceedences are highlighted in bold red
(Source: Glasgow City Council, 2009)

NO ₂ monitoring locations outwith existing AQMAs	NO ₂ µg m ⁻³ (2005 objective level: 40 µg m ⁻³ annual mean)			
	2006	2007	2008	Trend
Anniesland Cross	33	45	39	N/A
Queen Margaret Drive 2	35	33	42	N/A
Queen Margaret Drive 3	39	45	39	N/A
Napiershall Street	35	38	37	N/A
Finnieston Street	37	44	48	Increase

Given the proximity of this PM₁₀ vulnerable site to key Commonwealth Games venue locations, consideration of the Games' potential effect on air quality at the site has been a key issue in the assessment of the CG Strategy and Framework. Despite the PM₁₀ issues identified here, annual mean concentrations at this site has fallen in recent years and the 2010 objective for exceedences of the 24 hour mean are predicted to be met comfortably.

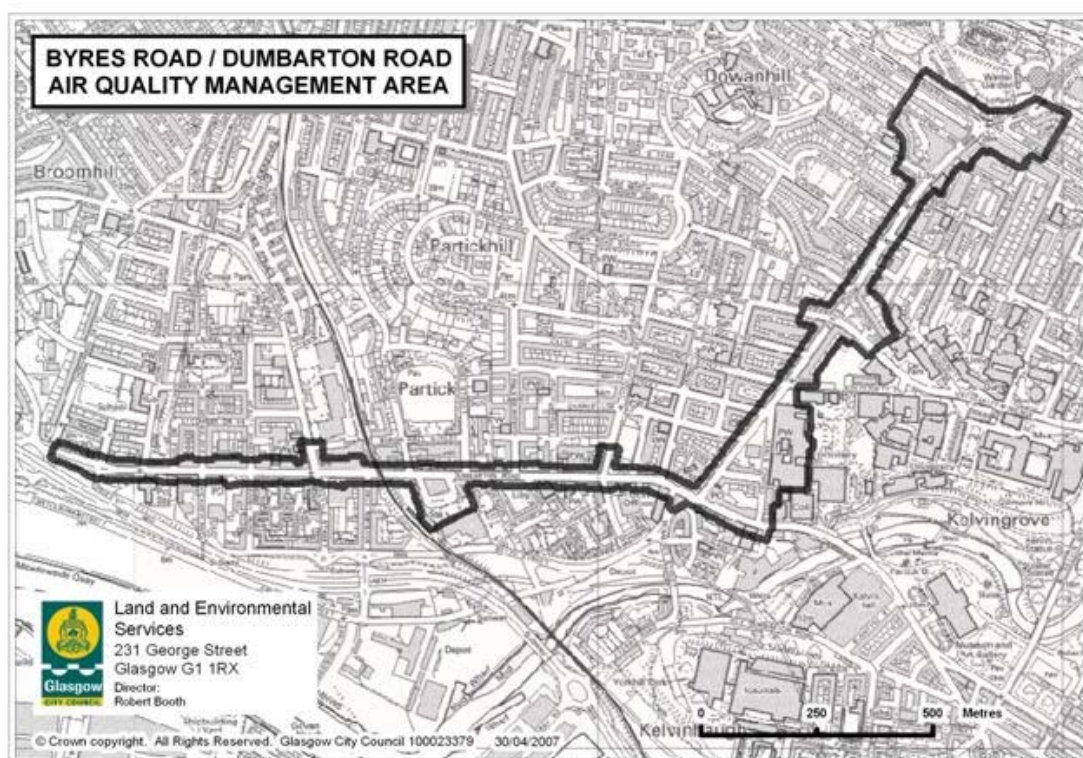


Figure 4.3 Byres Road and Dumbarton Road Air Quality Management Area

4.5.2 Air pollution

As described in Appendix G section 5.3, the main contributory factor to air quality issues in Glasgow is road transport. This section outlines some of the key transport related pressures and threats with respect to air quality in the west cluster area. The potential impact of current and future transport strategy and infrastructure projects on transport related emissions of air pollutants are also discussed.

In addition to an analysis of trends and modelled predictions, Glasgow City Council's statutory duty to review and assess air quality within their area is informed by a range of criteria that help to identify any new areas that might be vulnerable to air pollution from a range of source, including road traffic sources. Criteria include:

- Narrow congested streets with residential properties close to the kerb;
- Busy streets where people may spend one hour or more close to traffic;
- Roads with a high flow of buses and/ or Heavy Goods Vehicles (HGVs); and
- Junctions and busy roads.

Given these criteria above, it is clear to see why air quality is such an issue along Byres Road and Dumbarton Road. Due to the densely populated nature of many community areas in the west cluster (see Table 4.1), transport pressure for a variety of journeys and journey types is considerable. The prevalence of private car use and also the use of key local, non-strategic roads in the area by large numbers of commuters (e.g. Great Western Road, Dumbarton Road, Argyle Street etc) compounds this issue.

The Air Quality Action Plan 2009 (the AQAP) identifies a range of 'direct' actions aimed at improving air quality within the AQMAs. Whilst the impact of many of these actions on AQMA air pollution reduction is predicted to be low, two key actions – 'cleaner taxis' and 'air quality planning guidance', are predicted to have a 'medium' impact. The Council is also considering Low Emissions Zones as a potential approach and has committed to this strategy for a number of areas during the Games themselves.

Over and above specific actions to reduce air pollution outlined in the AQAP, two key infrastructure projects have potential to improve the situation. The recently completed Partick Interchange redevelopment project has substantially improved the facilities available for travellers including rebuilding the station and upgrading bus stances. Partick Interchange is already one of the busiest in Scotland with 4 million travellers a year using the bus, train and underground facilities on offer. The recent works may enhance the public transport offer here to the extent that private car users are encouraged to switch modes thus reducing transport related air pollution in the area. In addition, the proposed North Clydeside Development Route aims to reduce congestion on Dumbarton Road thus benefiting local air quality within the Byres Road and Dumbarton Road AQMA.

4.5.3 Noise

The west cluster area contains several candidate Noise Management Areas (NMA) designated for road traffic environmental noise. There are no candidate Quiet Areas (QA) in the west cluster. Please refer to Appendix G section 5.4 for further information on consideration of noise in the SEA of the CG Strategy and Framework.

Candidate Noise Management Areas designated for road traffic related environmental noise

- **Site:** Dumbarton Road (Harland Street), **Location:** Scotstoun/ Whiteinch;
- **Site:** Crow Road (Southbrae Drive), **Location:** Jordanhill Station;
- **Site:** Crow Road (Abbey Drive), **Location:** Jordanhill/ Broomhill;
- **Site:** Dumbarton Road (Balshagray Crescent), **Location:** Whiteinch/ Partick;

4.6 Soils & soil quality

As is common with the rest of the City, there are a large number of known and suspected contaminated land sites within the west cluster. The SECC complex has the largest number of contaminated land sites within and surrounding it, these being infilled former dry docks, print works, boiler works, foundries and shipyards.

Kelvingrove and Kelvinhall have a number of suspected sites concentrated around Yorkhill Hospital and the Great Western Infirmary, as well as smaller areas of former small-scale factories/ industrial sites and former sewage treatment sites. At Scotstoun there is an area of potentially contaminated land associated with the former military firing range that occupied the eastern portion of the leisure complex.

4.7 Climate change issues

As with the rest of the City, the main issues associated with Climate Change within the West End cluster are related to flood risk. Heavy rain fall in 2002, combined with high tides and winds resulted in extensive flooding in the west, with the area around the SECC being the worst affected area.

4.7.1 Flood risk provisions

In response to the extensive flooding in 2002, studies for the River Clyde Flood Management strategy were completed between May 2005 and January 2006 and included: 1) Early Action Area Report; 2) River Edge Treatment Report; 3) Broad Scale Modelling Report; and 4) Condition Assessment Report. These studies predicted that due to factors including climate change and sea level rise, the risk of flooding in Glasgow had increased to a level where protection measures needed to be considered.

Based on the findings of the studies, Glasgow City Council launched the River Clyde Flood Strategy Commission who worked to identify and develop an acceptable solution to provide protection from inundation by the River Clyde. Basic options that were considered comprised; 1) Direct defences; 2) Barrier/ barrage; 3) Upstream storage; and 4) Any suitable combination of the above. Based on the findings of these studies and options, the following proposals that have direct relevance to the West cluster area and are currently in planning stages are:

- **Anderston Quay:** Flood defences will be required, with a flood defence design level of 6.0m AOD. This level provides protection for a flood event of 0.5% (1 in 200 year) probability, taking into consideration climate change and freeboard levels. The defences will be incorporated as part of the improved high quality public realm and bolstered with folding demountable defences⁷;
- **North Renfrew Flood Prevention Scheme (including Scotstoun):** Phase 1 of the work involved the construction of flood embankments and retaining walls as well as the diversion of the Mill Burn culvert. The embankments have been created between the Scottish Water sewage pumping station off North Lodge Road and Meadowside Street/Neil Street. In addition, ramping of Ferry Road to the north of the junction with King's Inch Road has been introduced to provide initial flood protection and halt progress of flood waters into premises surrounding Canal Street and the town centre. Phase 1 creates a 1 in 10 year level of flood protection. Phase 2 involves the dredging of 10,000 tonnes of sediment from the river's bed before the foundations are laid for the new pumping station. Phase 3 will see the creation of a pumping station in the vicinity of Primrose Quay. This will ensure that the waters of the Mill Burn and surface water run off in the northern part of Renfrew will be discharged

⁷ <http://www.clydewaterfront.com/anderstonquay.aspx>

into the River Clyde at times of moderate or high river levels - decreasing flood risk from these sources. Once Phase 3 is complete the area will have a 1 in 200 year level of flood protection⁸; and

- **Lancefield Quay:** Flood defences will be required, as there is a requirement to protect to a flood defence design level of 6.0m AOD. This level provides protection for a flood event of 0.5% (1 in 200 year) probability, taking into consideration climate change and freeboard levels. The defences will be incorporated as part of the improved high quality public realm and bolstered with folding demountable defences⁹.

4.7.2 Renewable energy provisions – potential areas for development

As stated in Appendix G section 7.1, Glasgow emits around 4 million tonnes of CO₂ per annum, linked to its energy use – around 8% of Scotland's carbon emissions. The long-term trend if for this to increase unless action is taken. A City-wide strategic analysis enabled the initiative to identify those opportunities that would deliver significant carbon emission reductions – as well as being both technically and commercially feasible. Major opportunities have been identified in the areas of combined heat and power/ district heating, waste to energy systems; renewable energy; sustainable transport; smart energy networks; and energy management.

The West End has some of the highest greenhouse gas emissions in Greater Glasgow¹⁰ due to the large amount of traffic in the area, coupled with concentrated residential settlements and large number of commercial outlets. The city-wide strategic study did not identify any areas within the West End that were immediately suitable for the opportunities outlined above, with the exception of two potential district heating zones¹¹

4.7.3 Green Spaces

The Sustainable Glasgow Initiative has stated that there is considerable potential within Glasgow to literally make the City greener – which would not only help towards improving the quality of life of its citizens, but also contribute towards the lowering of carbon emissions. The west cluster area has particular potential for urban woodlands, and the development and enhancement of its existing green spaces. See section 4.3.3 for further information.

4.8 Landscape & the historic environment

Games activity within the West cluster area will be concentrated around the four main venue areas: Scotstoun, SECC, Kelvingrove and Kelvin Hall. Each of these areas contributes towards the unique character and townscape of the West End, and each area provides its own opportunities and potential issues. A brief history, followed by the current character and potential opportunities and constraints presented by each area follows below.

For each venue a buffer of 500 metres has been developed in order to identify those elements of the surviving historic townscape and landscape that could potentially be affected by Commonwealth Games-related works. Further details of designated cultural heritage assets are provided in Appendices G and H.

⁸ http://www.clydewaterfront.com/north_renfrew_flood_prevention.aspx

⁹ http://www.clydewaterfront.com/lancefield_quay_flood.aspx

¹⁰ Sustainable Glasgow Report, p.31 *Glasgow's Carbon Emissions 2006/ 7: Geographic analysis*

¹¹ Sustainable Glasgow Report, p. 70 *Proposed District Heating Zones for Glasgow*

4.8.1 Local plans, policies and strategies

Of particular relevance to the west cluster area are the Conservation Area Appraisals for Scotstoun and Glasgow West which contain information on the historic character of these areas and set out recommendations for conservation and enhancement and how development can contribute towards this.

There are two other Conservation Areas as well as information pertinent to the Park and Woodlands Conservation Areas which are scheduled to have appraisals undertaken in the future.

4.8.2 Scotstoun

Within 500m of the Scotstoun Venue there are:

- 8 Listed Buildings – 5 Category B and 3 Category C(S);
- 2 Conservation Areas – Scotstoun and Victoria Park
- 1 Garden and Designed Landscape – Victoria Park

Scotstoun is located to the west of the City centre and north of the River Clyde. From the medieval period through to the latter half of the 18th century the Scotstoun Estate changed hands between various families, with the last being the Oswalds who bought it from the Walkinshaws in 1751. The Oswalds ran the estate until the last decade of the 19th century, when it was slowly taken over for workers housing associated with the rise of shipbuilding on the Clyde. By 1895 the Scotstoun Estate Building Company was established to provide housing on a commercial basis along similar lines to previous philanthropic ventures which established workers housing. Development commenced at the eastern end of Scotstoun with the earliest surviving houses being along Lennox Avenue, Vancouver Road, Earlbank Avenue and Norse Road.

By 1913 development west of Lennox Avenue was completed. The Glasgow Agricultural Society Showground (now the site of the Scotstoun Stadium complex) was also in place by this time, lying immediately to the north of the terraced workers housing. A large proportion of the housing to the south and west of the stadium lie within the Scotstoun Conservation Area. The area is bounded by Danes Drive to north, Dumbarton Road to the south, Queen Victoria Drive to the west and the line of the landscape pedestrian footway, which occupies the site of the former Victoria Park Goods Station, to the east. It is centred on Scotstoun Primary School and is separated from the tenements of Partick by Victoria Park to the west and from the residential area of Jordanhill by the stadium and leisure centre to the north.

The land around Scotstoun Stadium and Leisure Centre has no topographical features and is generally flat with only a slight incline from Dumbarton Road towards the north-western part of the Stadium area. The northern and north-eastern boundaries (Danes Drive and Northland Lane) of the Conservation Area lie adjacent to Scotstoun Stadium and are therefore those areas that should be subject to more detailed assessment. In particular there are many opportunities that could be identified for enhancement and improvements; as well as areas that should inform on appropriate design for new public realm works for example.

4.8.3 Kelvingrove and Kelvin Hall

Within 500 metres of Kelvingrove and Kelvin Hall there are:

- 94 Listed Buildings – 32 Category A; 52 Category B and 10 Category C(S);

- 3 Conservation Areas – Glasgow West, Park and St Vincent’s Crescent;
- 1 Garden and Designed Landscape – Kelvingrove Park

As is evident from the number of Listed Buildings and Conservation Areas within this area, it retains a high proportion of its original historic character, and is therefore sensitive to change, both in a potentially positive or negative manner. The area is predominantly designed parkland, bounded by Great Western Road to the north, Hillhead and Partick to the west, Yorkhill, Kelvinhaugh and the Clyde to the south and the City centre of the east. The River Kelvin with its associated walkway runs through the centre of the Park down towards the Clyde.

The area surrounding the venues has a mixture of Victorian, Edwardian and later residential, open space, institutional and small-scale retail use and has a distinct character provided by the Park and the well known iconic buildings within and adjacent to it, such as Glasgow University and the Kelvin Hall and Kelvingrove Art Gallery and Museum.

There has been relatively little change here and it still retains a large amount of its original character, and as such represents an important surviving element of Victorian and early 20th century Glasgow. Landscaping and public realm within Kelvingrove Park is sympathetic to its surroundings, and the Park area is delineated from the surrounding residential areas by uniform green railings and bollards.

Views to Park Circus to the north of the Park, to the University and towards the Woodlands Conservation Area can be gained from many viewing and vantage points, and as such it is clear that the area still forms part of a cohesive townscape character running from the west end down towards the centre of Glasgow. Views towards the south are obscured by the tall tenements along Argyle Street, although Yorkhill Hospital and glimpses towards the South Side can be seen throughout the area.

4.8.4 SECC Venue complex

This area has seen significant redevelopment over the past 25 years and as such does not retain much of its original historic character. It is dominated by the large SECC complex and the Clyde Auditorium which in many ways has become an icon of modern Glasgow. However it is also evident that the area’s industrial past has not been wiped out wholesale. The large, dominant Finnieston Crane towers over the area, and the Rotunda and cranes of Govan shipyards represent important surviving historic assets.

The SECC is located within what used to be the heart of Glasgow’s shipbuilding and trading area. The Finnieston Crane and the nearby shipyards at Govan over the water are a tangible survival of the past use of the site. Nowadays the SECC complex is at the heart of Glasgow’s continued regeneration, with extensive residential, cultural, leisure and retail developments having been developed over the last 20 years.

The few surviving elements of the area’s industrial past are currently fairly detached from each other, and the whole area does not have a fully coherent historic character. This means that there are significant opportunities within the SECC complex for the provision of suitable public realm that ‘joins up’ the surviving elements of the area’s past, as well as providing interpretational material that can communicate this with the people who use the area.

The SECC complex is also detached from the surrounding associated townscape, in particular the areas of Yorkhill, Anderston and Partick that were the residential areas used by workers on the Clyde. The construction of the Clyde Expressway to the north and the Kingston Bridge to the east has created an

artificial 'island' within which the complex sits, and there is little to connect it to the rest of the City. Again, with the introduction of suitable new public realm and associated interpretation as part of the Commonwealth Games development, this current situation could be suitably remedied.

Within 500 metres of the SECC Commonwealth Games venue complex there are: 13 Listed Buildings – 6 Category A and 13 Category B

5. EAST CLUSTER, ENVIRONMENTAL OBJECTIVES, BASELINE AND CONTEXT

5.1 Introduction

Historically, Glasgow's east end has suffered the traits of many post-industrial communities. In particular, issues of chronic under investment have led to problems associated with outward migration, urban dereliction, high unemployment and poor image. Consequently, the east end of Glasgow is considered as one of the most significant areas of urban dereliction in Scotland (GCC, 2009). From an environmental perspective, the types of issues faced in the east end include a prevalence of vacant and derelict land, prevalence of potentially contaminated land, poor provision of quality public open space, community fragmentation, poor connections/ linkages between adjoining areas/ communities and a generally poor quality built and physical environment (Clyde Gateway URC, 2006). As discussed in Appendix G section 2.2, these are all key environmental determinants of health and, as such, may influence the health of local residents. The CG Strategy and Framework has substantial potential to contribute to improvements across all these issues. Of crucial importance for the SEA has been the identification of realistic and tangible opportunities whereby pre-games development activity and post-games legacy projects can be enhanced to ensure maximum environmental benefit for local communities in the east cluster.

In response to the types of issue identified above, a range of cross-cutting plans, programmes and strategies (PPS) have been developed. The core objective of these PPS is to support the east end of Glasgow's socio-economic and environmental regeneration. Amongst others these include:

- Relevant provisions from GCC's City Plan 2;
- The Clyde Gateway Urban Regeneration Company's (URC) Business Plan;
- The East End Local Development Strategy;
- The Dalmarnock and NISA Planning Framework and Economic Appraisal; and
- The South Dalmarnock Masterplan.

Whilst there are clearly a broad range of existing environmental issues and problems within the east cluster, there are also a number of important environmental and other strengths and opportunities. The area's close proximity to the city centre in conjunction with the forthcoming completion of the M74 extension and East End Regeneration Route (EERR) will arguably make the east end of Glasgow one of the most accessible urban centres in Scotland (Clyde Gateway URC, 2006). In addition, its riverside setting provides an attractive location for sustainable housing, business and wider community development. Central to the success of the five key PPS outlined above will be the degree to which the CG Strategy and Framework's programme of pre-games development and post-games legacy strategy catalyses private sector led regeneration in Glasgow's east end.

The east cluster area encompasses several distinct communities that fall within the scope of two of Glasgow's Local Community Planning Partnership (CPP) areas: 1) Calton and East Centre Local CPP; and 2) Baillieston, Shettleston and Eastern Glasgow Local CPP. In particular, the CG Strategy and Framework's broad east cluster area encompasses the following communities:

- Parkhead and Dalmarnock;
- Calton and Bridgeton; and
- Tollcross and West Shettleston.

5.2 People, health & access

In a city wide context, there is no doubt that Glaswegians are now living longer. Despite this, there remain stark inequalities in health across Glasgow's various communities. In particular, health inequality is a key issue across the Glasgow east communities that may be affected by east cluster Games related activity (e.g. pre-games development projects including the NISA/ Velodrome, Tollcross Pool and the various public realm and transport infrastructure enhancements). For example, men born in the more affluent suburbs of Bearsden and Clarkston can expect to live to over 80. In contrast, the life expectancy of men born in many east end communities is approximately 20 years less than this. The remainder of this section outlines a range of population and human health baseline information and highlights key issues and opportunities that the SEA and ongoing development of the CG Strategy and Framework should consider. In line with the SEA legal framework, guidance and generally accepted good-practice, 'human health' as such is only considered in the context of health issues that can be affected by environmental factors.

5.2.1 Demographics

Whilst local population in other parts of Glasgow is relatively stable, historic trends show how the area encompassed by the CG Strategy and Framework's east cluster has suffered from population loss. Glasgow east's population has declined by approximately 11,500 people over the last decade. This, in part at least, is due to the types of issue described at the start of this section as residents are forced to move away in search of better opportunities. Proxy population statistics for the 'east cluster' area as a whole and its communities are shown in Table 5.1. East Glasgow as a whole has an approximate population of 124,000 people made up of 18% children, 66% young and middle-aged adults and 16% older people. There are currently around 60,000 households in east Glasgow of which over 40% are single adult occupancy (GCPC, 2008). Figure 5.1 shows population density in the Clyde Gateway project area. The most significant 'east cluster' populations are located in the Bridgeton Cross and north Dalmarnock areas (LUC, 2007).

There are two key strategies driving population change in the east cluster area. In line with the Glasgow and Clyde Valley Joint Structure Plan's (JSP) sustained growth agenda, GCC's City Plan 2 includes provision for a regeneration strategy in the Clyde Gateway area¹². The Clyde Gateway URC's Business Plan is the second element of strategy. These two strategies are supported by several more detailed planning frameworks including the East End Local Development Strategy and the South Dalmarnock Masterplan. Taken in the round, these lower level PPS provide the local level planning policy context that guides public and private sector development and investment in the area. The overall approach to the east end's regeneration is to secure the necessary infrastructure and service provision to attract new residents and businesses to the area.

In line with the above, a key objective of the Clyde Gateway URC's Business Plan is the removal of barriers and constraints to private sector investment (e.g. remediation of contaminated land to catalyse private sector interest in the development of new housing, business space and industrial facilities). The URC's Business Plan outlines its proposed approach to regeneration which, from a demographic perspective, aims to stem population loss from the area. Specifically, the URC aim to:

- Deliver 10,000 new homes;
- Create 21,000 new jobs;
- Build 400,000 m² of new business space; and

- Increase the population across affected communities by 20,000 people.

Table 5.1 East cluster proxy population statistics

(Source: GPCH, 2008)

Community Planning Partnership area	Neighbourhoods encompassed Note: neighbourhoods falling distinctly within the 'east cluster' are highlighted in bold	Population
East cluster total population (proxy): 34,457		
East Centre and Calton	Parkhead and Dalmarnock	6,200
	Calton and Bridgeton	12,960
Baillieston/ Shettleston and Eastern Glasgow	Tollcross and West Shettleston	15,297

City Plan 2's strategy for the Clyde Gateway echoes that of the URC's Business Plan but encompasses a larger area than that delineated by the URC's project area. In addition, the City Plan 2 strategy includes provision for a Community Growth Area in the Broomhouse/ Baillieston/ Carmyle area (incorporating capacity for 1,500 homes) and a New Neighbourhood area at Oatlands which is south of the river (incorporating capacity for 1,300 homes).

The combined impact of Clyde Gateway strategies from both City Plan 2 and the URC's Business Plan will lead to a substantial increase in population in the east cluster area. Undoubtedly, the Clyde Gateway strategy's ambitious population and housing targets will place additional pressure on a range of existing services (delivery of one project has already been delayed by drainage provision issues for example). Despite this, both the City Plan and the URC's strategies have long term timeframes (20 years in both cases) which should facilitate the phased enhancement of services in line with population increase. Indeed, City Plan 2's development and design policies include a range of provisions to account for this very issue. Despite this, it is much more complex to plan for the provision of ecosystem services e.g. decoupling increased population/ transportation requirements with increased private car use and the associated negative effects on air quality. A key issue for the SEA to address is the identification of opportunities whereby the CG Strategy and Framework can deliver environmental enhancements that protect and enhance ecosystem resilience in the east cluster area to help assimilate the planned increase in population.

5.2.2 Health and the environmental determinants of health

The health of the population is largely influenced by a range of factors or 'determinants' of health. These can be broadly categorised on the basis of whether they are social, economic or environmental. Given this, environmental issues across all SEA topics and sub-topics highlighted in this east cluster specific baseline section may have a bearing on the health and well-being of east cluster residents. These can be tangible links such as the impact of poor air quality on people with respiratory conditions. Equally, links can be less tangible but no less important such as the sense of well being attached to living in attractive and clean surroundings with ready access to high quality open space and recreational facilities.

This section outlines some of the key health issues in the east end and, where relevant, summarises specific interrelationships between human health and the state of the environment in the east cluster. There is a broad range of information available on health issues within the east end e.g. Local Community Planning Partnership (CPP) Residents' Surveys, Glasgow Centre for Population Health's (GCPH) Community Health

¹² In conjunction with the Clyde Waterfront and City Centre areas, the Clyde Gateway area forms part of City Plan 2's 'Metropolitan Growth Corridor' strategy

and Wellbeing Profile and the Commonwealth Games Health Impact Assessment (HIA). Given this and where relevant, information here has been documented at the level of individual communities e.g. Parkhead and Dalmarnock, Calton and Bridgeton etc.

Community perceptions of environmental quality and environmental services

A report published by ODS Consulting in 2007 documents the outcomes of a residents' survey in the East Centre and Calton Local CPP area. As depicted on Figure 5.2, this area encompasses the key east cluster communities of Parkhead/ Dalmarnock and Calton/ Bridgeton. Residents were asked to comment on a range of issues in relation to 'cleansing and the environment' and 'quality of your neighbourhood'. Data was collected for the Local CPP area as a whole and also individual communities. Tables 5.2 and 5.3 summarise some of the key findings from this study for the Local CPP area as a whole. Crucially, data available as part of this study provides a key indication of how local residents perceive the quality of their local environment. At the CPP level, a key trend observable from the data is that residents are broadly happy with cleansing and environment services and the quality of their neighbourhoods. Key areas of concern, limited as they are, are in relation to: 1) litter in the streets; 2) graffiti; and 3) the provision of children's play areas. A considerable majority of residents are happy with attractiveness and peace and quiet of their environment. Indeed 61% of Calton and East Centre residents reported that they consider the overall quality of their neighbourhood to be 'good' (ODS Consulting, 2007).

Calton and Bridgeton

Similarly to the Local CPP area as a whole, the majority of Calton and Bridgeton residents are reportedly content with the quality of their neighbourhood and cleansing and environmental services (60% of residents consider the overall quality of their neighbourhood to be 'good'). Litter in the streets is perceived to be more of a problem in the Calton/ Bridgeton communities than the Local CPP area as a whole (26% of residents reported litter as a 'problem' compared to 22% across the area as a whole).

In contrast to the Local CPP area as a whole, Calton/ Bridgeton residents have more concerns regarding the quality of their neighbourhood/ environment (see Table 5.4). At the area level, key concerns were limited to the provision of parks/ open space and children's play areas. At the Calton/ Bridgeton community level, important issues were raised across all criteria.

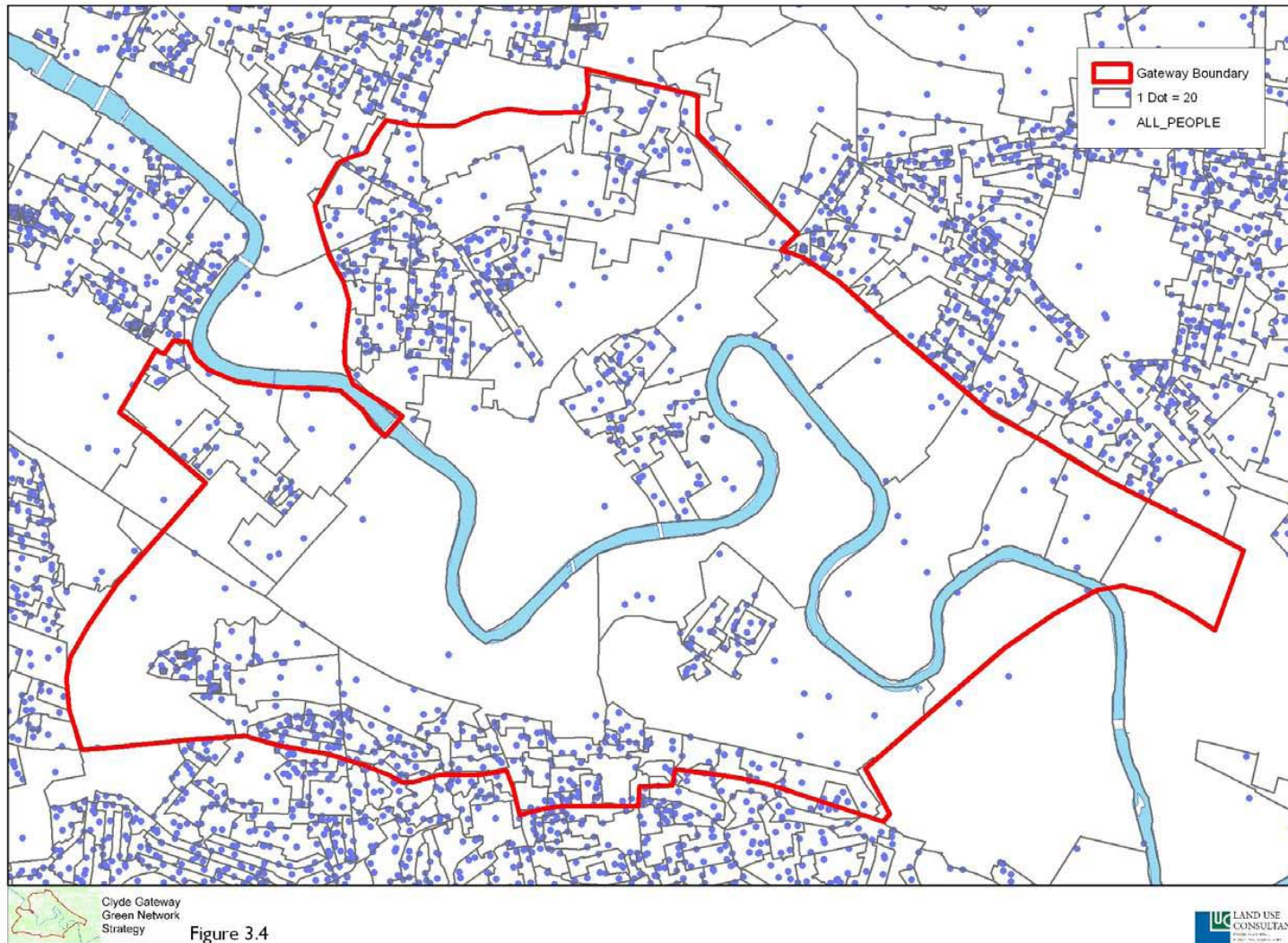


Figure 5.1 Population distribution in the Clyde Gateway area

(Source: LUC,2007)

Crucially, 8% of residents consider the attractiveness of buildings and environment to be 'very poor' and 10% also consider the provision of children's play areas to be 'very poor'. The percentage of community residents who consider 'quality of neighbourhood' criteria to be 'good' is broadly the same as that for the area as a whole. Despite this, the frequency with which Calton/ Bridgeton residents consider these criteria to be 'very good' is significantly lower than that for the Local CPP area as a whole (ODS Consulting, 2007).

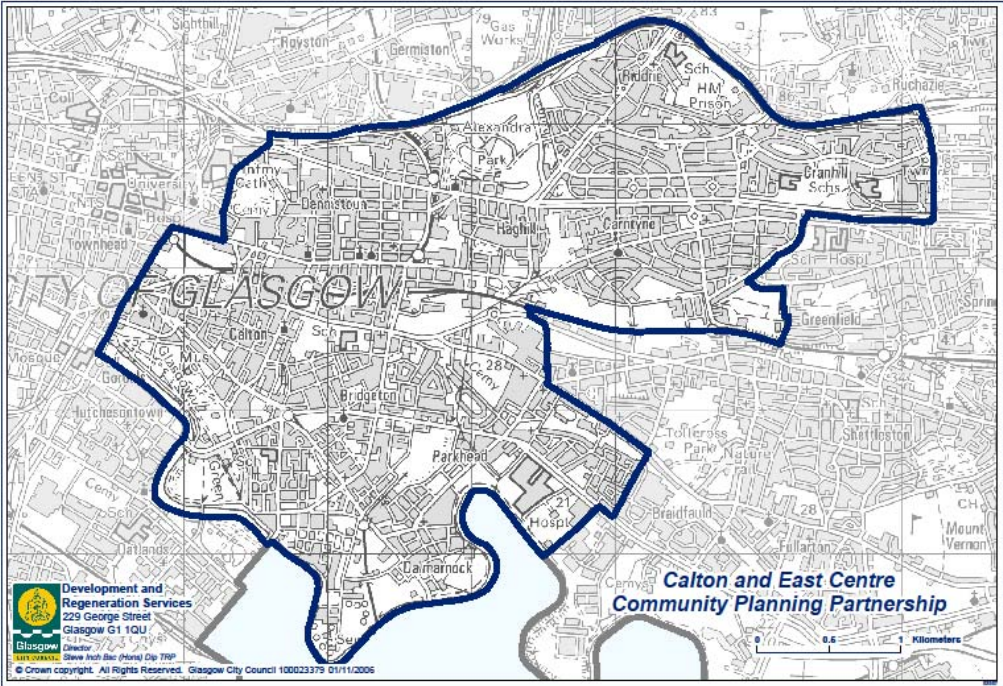


Figure 5.2 Calton and East Centre Local CPP area

Table 5.2 Summary findings from the Calton/ East Centre Local CPP 'Cleansing and Environment' survey

(Source: ODS Consulting, 2007)

Criteria	Summary statistics (note: emphasis added)			
	Serious problem	Problem	Not much of a problem	Not a problem at all
Litter in the streets	7%	22%	26%	39%
Untidy gardens	4%	11%	26%	52%
Untidy communal areas	3%	10%	24%	55%
Dirty stairs and closes	2%	6%	14%	53%
Graffiti	3%	17%	20%	54%
Fly tipping and dumping	3%	13%	14%	63%

Table 5.3 Summary findings from the Calton/ East Centre Local CPP ‘Quality of your neighbourhood’ survey

(Source: ODS Consulting, 2007)

Criteria	Summary statistics (note: emphasis added)			
	Very poor	Poor	Good	Very good
Attractive buildings	4%	6%	58%	14%
Attractive environment	4%	6%	58%	12%
Quiet and peaceful environment	4%	6%	56%	13%
Parks/ open spaces	5%	10%	50%	10%
Children’s play areas	9%	16%	31%	6%
Overall quality	2%	4%	61%	15%

Table 5.4 Summary findings from the Calton/ Bridgeton ‘Quality of your neighbourhood’ survey

(Source: ODS Consulting, 2007)

Criteria	Summary statistics (note: emphasis added)			
	Very poor	Poor	Good	Very good
Attractive buildings	8%	13%	57%	3%
Attractive environment	8%	14%	58%	2%
Quiet and peaceful environment	7%	10%	56%	2%
Parks/ open spaces	7%	13%	59%	3%
Children’s play areas	10%	16%	43%	2%
Overall quality	6%	8%	25%	60%

Parkhead and Dalmarnock

Similarly to the Local CPP area as a whole and the Calton/ Bridgeton community area, the majority of Parkhead and Dalmarnock residents are reportedly content with the quality of their neighbourhood and cleansing and environmental services (66% of residents consider the overall quality of their neighbourhood to be ‘good’). Whilst litter in the streets is perceived to be less of a problem in the Parkhead/ Dalmarnock communities than the Local CPP area/ Calton and Bridgeton (19% of residents reported litter as a ‘problem’ compared to 22% across the area as a whole and 26% in Calton/ Bridgeton), graffiti is considered more of an issue (22% of resident reported graffiti as a ‘problem’ in contrast to 17% across the area as a whole and 18% in Calton/ Bridgeton).

As shown in Table 5.5, the way in which Parkhead/ Dalmarnock residents perceive the quality of their neighbourhood echoes that of the Local CPP area as a whole. Key issues raised are in relation to the

provision of parks and open spaces (14% of residents consider this to be 'poor') and that of children's play areas (25% of residents consider this to be 'poor' and 11% 'very poor').

Table 5.5 Summary findings from the Parkhead/ Dalmarnock 'Quality of your neighbourhood' survey

(Source: ODS Consulting, 2007)

Criteria	Summary statistics (note: emphasis added)			
	Very poor	Poor	Good	Very good
Attractive buildings	4%	6%	56%	13%
Attractive environment	2%	7%	56%	13%
Quiet and peaceful environment	3%	6%	58%	10%
Parks/ open spaces	5%	14%	52%	6%
Children's play areas	11%	25%	33%	4%
Overall quality	1%	4%	66%	12%

Health issues and potential relationships with perceived and actual environmental quality

The approach adopted in the consideration of health issues during the collation of this environmental baseline information is described in section 5.2.2. An analysis of the data in table 5.6 highlights two key east cluster health issues:

- Residents of east Glasgow as a whole have worse health than the average Scot; and
- Residents of the Calton/ Bridgeton and Parkhead/ Dalmarnock communities have worse health than the average east Glasgow resident.

As outlined above, relevant health issues in the east cluster area may, in part at least, be attributed to various environmental factors. Given this, a key aim for the SEA has been to identify opportunities whereby the various provisions of the CG Strategy and Framework can work towards improving relevant environmental conditions (e.g. greenspace provision etc) which may in turn then improve public health. The remainder of this section highlights the potential relationships between the health of east cluster residents and key environmental determinants of health that the CG Strategy and Framework has potential to influence.

Calton and Bridgeton

As outlined in Table 5.6, residents of the Calton and Bridgeton area experience a range of health problems. Furthermore, the majority of these local level problems are more severe than those experienced by the average Scottish and indeed east Glasgow resident. A number of these health problems are arguably influenced by environmental factors. For example, easy access to quality greenspace and/ or other recreational space can encourage increased uptake of suitable exercise in line with national guidelines. This in turn can contribute to increased life expectancy and reduced risk of heart disease (NHS, 2010) which are two of the most important health problems in Calton/ Bridgeton and indeed Glasgow east. Clearly, there are a range of issues other than greenspace provision that can influence uptake of exercise. Despite this, the

provision of easily accessible, high quality greenspace can be a key factor influencing a person's choice to engage in an appropriate level of physical exercise (ref.).

As shown on Figure 5.3, the Calton and Bridgeton area is relatively well served by a range of greenspace including public parks and gardens and amenity greenspace. The proximity of Glasgow Green is a key greenspace resource for local Calton and Bridgeton residents and indeed residents from the wider area including Parkhead and Dalmarnock. As outlined in section above, 25% and 60% of Calton/ Bridgeton residents describe the quality of their neighbourhood as 'good' and 'very good' respectively.

Figure 5.4 shows estimated annual mean concentrations of NO₂ in Glasgow and surrounding Local Authorities. In particular, the area with the highest annual average NO₂ concentrations (i.e. 40 µg m⁻³ and above which is above the current annual mean objective) encompasses part of the Calton/ Bridgeton area. NO₂ is associated with adverse effects on human health and at high concentrations can cause inflammation of the airways and enhance the response to allergens in sensitive individuals. Long term exposure may affect lung function and respiratory symptoms (Defra, 2007). Whilst there is no data available on the impact of poor air quality on the health of Calton/ Bridgeton residents, air quality is a key environmental determinant of health. Given this, the CG Strategy and Framework should work towards the alleviation of air quality issues in the east cluster area and, as a minimum, ensure that it does not contribute to any further degradation of air quality and associated health impacts.

Parkhead and Dalmarnock

Parkhead and Dalmarnock residents experience a similar range of health problems to Calton and Bridgeton residents (see Table 5.6). As depicted on Figure 5.3, the Parkhead and Dalmarnock area is significantly less well served than Calton/ Bridgeton with easily accessible public greenspace (parks and gardens and amenity greenspace) in their community. Despite this, there is a substantial greenspace resource in the area, the key issue being that the majority of this is currently inaccessible natural/ semi-natural habitat. This issue is reflected in the Parkhead and Dalmarnock residents survey i.e. 25% of residents describe the provision of children's play areas as 'poor' and 14% describe the provision of parks/ open spaces as 'poor'. Both of these statistics are higher than the average for the wider study area (in this case, the Calton and East Centre Local Community Planning Partnership area). The Parkhead and Dalmarnock area experiences similar air quality issues to these described above. In addition, Parkhead cross is home to one of Glasgow's three AQMAs.

Based on the above, it is arguable that the local environment plays a key role in influencing the health of 'east cluster' residents. Given its objectives and scope, these issues raise a key opportunity whereby the ongoing development of the CG Strategy and Framework can be refined to maximise health related environmental benefits for local residents. Key issues for consideration are as follows:

- Residents of the Calton and Bridgeton areas enjoy access to one of the finest parks in Glasgow at Glasgow Green and also a range of other amenity greenspace. Despite this, the area is less well served with natural/ semi-natural habitat. A key issue for the SEA to consider is how the ongoing development of the CG Strategy and Framework can work towards the removal of barriers (both physical and psychological) to greenspace related outdoor activity and exercise; and
- The Parkhead and Dalmarnock area is less well served with public parks and gardens than Calton and Bridgeton but contains a substantial natural/ semi-natural habitat resource. The SEA should support the identification of realistic opportunities whereby these sites can be enhanced and managed for a range of objectives including public access for outdoor activity and exercise.

Table 5.6 Glasgow east, key health outcome indicators that may be influenced by environmental factors

(Source: GCPH, 2008)

Indicator	East Glasgow		Calton and Bridgeton			Parkhead and Dalmarnock		
	Local data	Position relative to Scottish average	Local data	Position relative to East Glasgow average	Position relative to Scottish average	Local data	Position relative to East Glasgow average	Position relative to Scottish average
Population and demographics								
Male life expectancy	68.1 years	Lower (8%)	61.8 years	Lower	Lower (16%)	62.8 years	Lower	Lower (15%)
Female life expectancy	76.0 years	Lower (4%)	74.6 years	Lower	Lower (6%)	74.3 years	Lower	Lower (6%)
Single adult households	23,907 (39.9%)	Lower (7%)	3,367 (49.5%)	Higher	Higher (16%)	1,518 (46.4%)	Higher	Higher (8%)
Mortality								
Deaths all ages ¹³	8,887	Higher (40%)	1,007	Higher	Higher (74%)	548	Higher	Higher (70%)
Coronary heart disease deaths in under 75s	821	Higher (63%)	114	Higher	Higher (122%)	67	Higher	Higher (148%)
Cerebrovascular disease deaths in under 75s	248	Higher (48%)	19	Lower	Lower (10%)	18	Higher	Higher (86%)
Mental health and function								
Self assessed health classified as 'not good'	23,284 (18.3%)	Higher (80%)	2,684 (22.1%)	Higher	Higher (117%)	1,620 (23.2%)	Higher	Higher (128%)
Patients prescribed drugs for anxiety/ depression	15,829 (11.8%)	Higher (46%)	1,584 (11%)	Lower	Higher (36%)	917 (12.8%)	Higher	Higher (59%)
Housing and transport								
Overcrowding ¹⁴	14,452 (24.6%)	Higher (110%)	1,735 (28.3%)	Higher	Higher (141%)	1,138 (31.9%)	Higher	Higher (171%)
Travelling to work by foot, bike or public transport	38,850 (58.9%)	Higher (32%)	4,189 (70.0%)	Higher	Higher (57%)	2,109 (71.9%)	Higher	Higher (61%)

¹³ All mortality statistics have been calculated as annual averages over a five year period

¹⁴ Percentage of all households considered to be overcrowded – relates the actual number of rooms in a household to the number of rooms 'required' by the members of the household (based on the relationships between them and their ages)

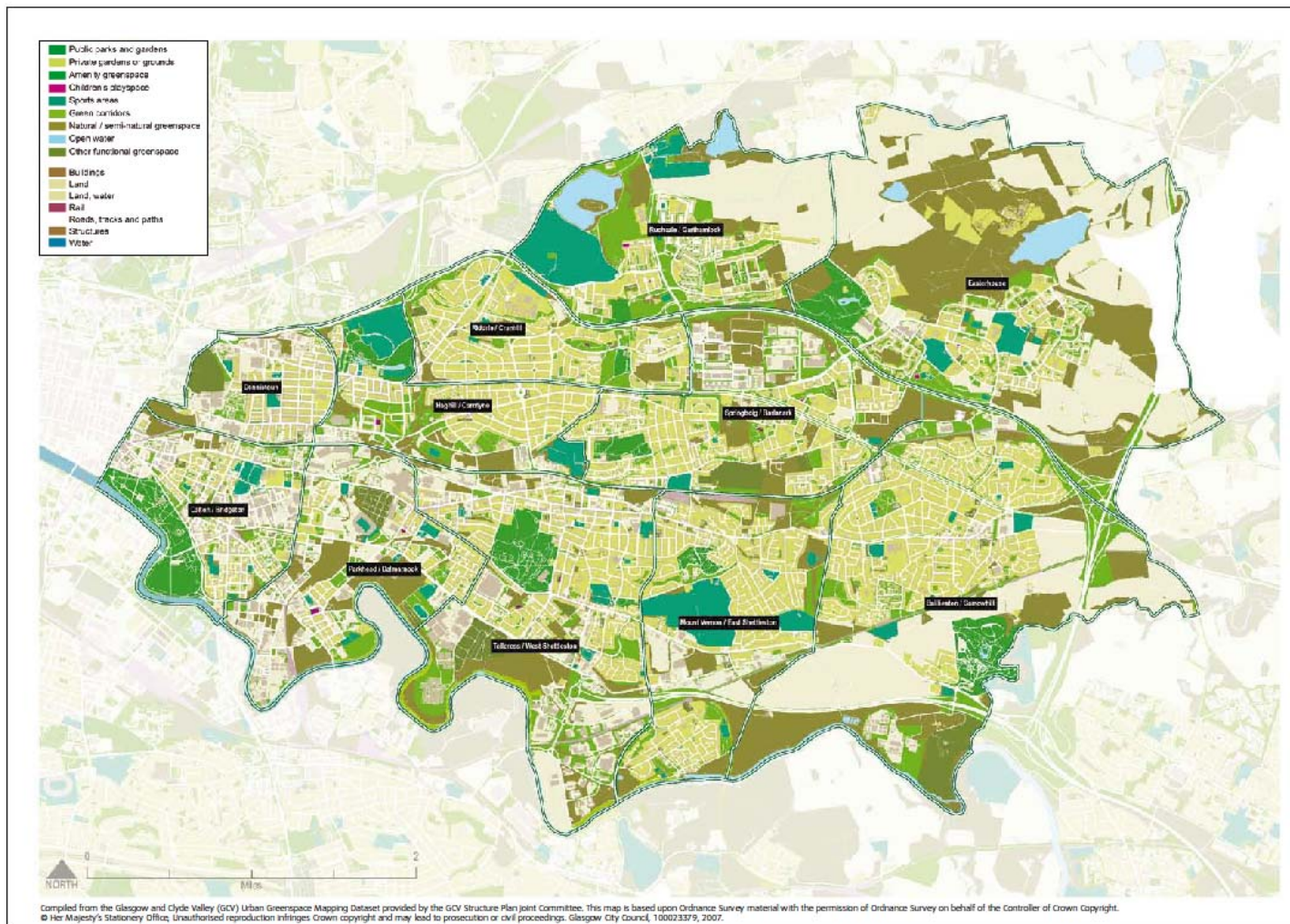


Figure 5.3 East Glasgow greenspace provision

(Source: GCPH, 2008)

As outlined at the start of this section, there are a range of PPS that are of specific relevance to Glasgow east and, in particular, the communities encompassed by the CG Strategy and Framework's east cluster. The key objective of these PPS is to support the socio-economic and environmental regeneration of Glasgow east by removing barriers/ constraints to private sector investment in the area. Any actions, policies and proposals that support the delivery of improvements across environmental issues that can influence health have potential to contribute to improved health in local residents.

A key issue for the SEA to address therefore is the identification of synergies and opportunities whereby the CG Strategy and Framework can support and enhance the delivery of the objectives of key related PPS. Table 5.7 outlines some key provisions from City Plan 2 (GCC, 2009) and the East End Local Development Strategy (GCC, 2007), their potential environmental implications and also how these implications may influence the health of east cluster residents. By highlighting environmental objectives of key related PPS, Table 5.7 provides an indication of how some aspects of the environmental baseline in the east cluster area may evolve in the absence of the CG Strategy and Framework.

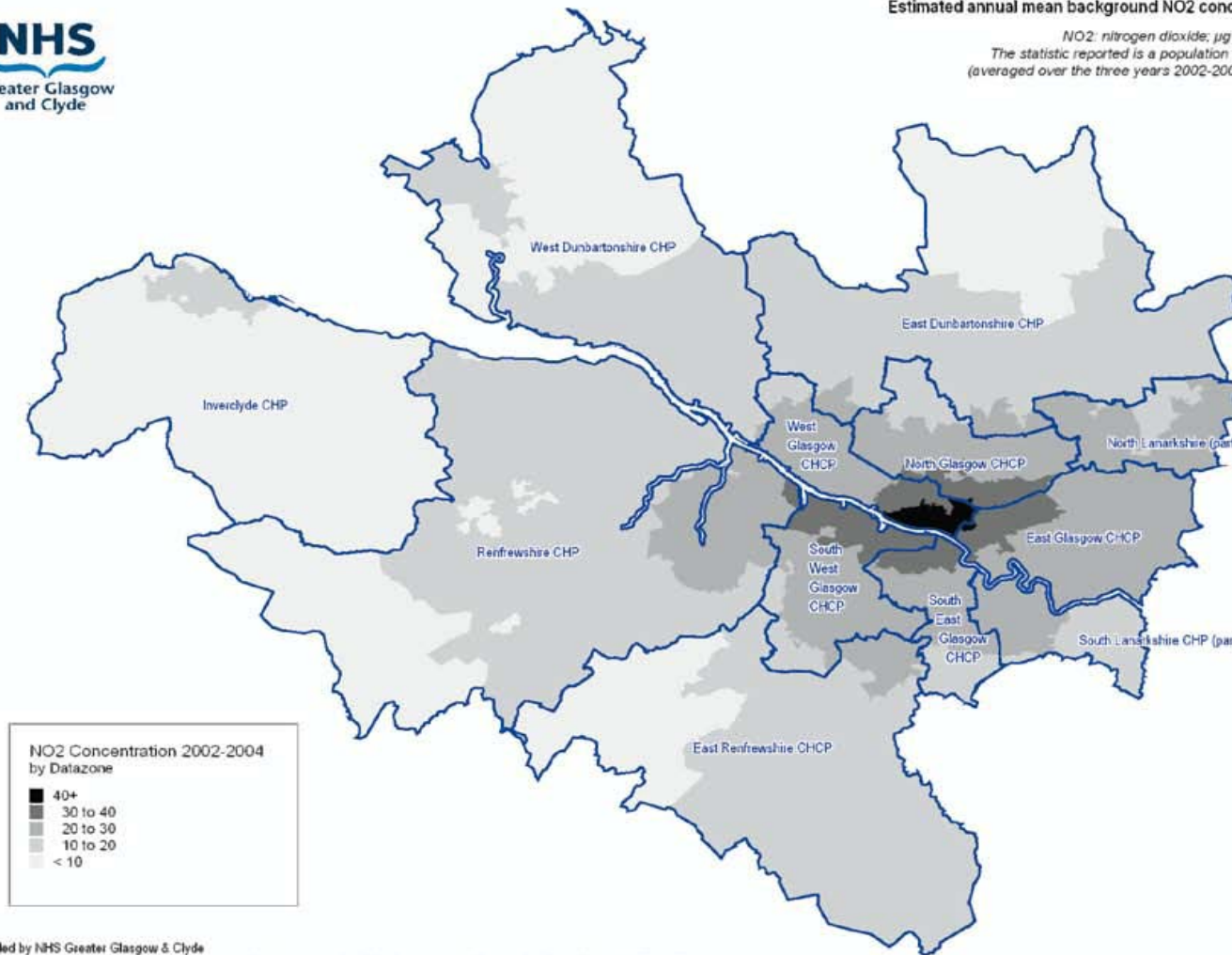
5.2.3 Access

As discussed above and extensively in Table 5.7, accessibility is a key issue that can influence the health of east cluster residents. Accessibility in this context is primarily related to the ease with which residents can access public open space for recreational purposes (e.g. parks and gardens, amenity greenspace etc) and use the area's network of paths for recreation in their own right. Issues relating to the potential health impact associated with the availability of recreational space are discussed above. This section summarises the current and potential future situation in relation to accessibility via the east cluster's network of paths.

Glasgow's Core Paths Plan identifies a range of existing and aspirational core paths for Glasgow. Key objectives of the Core Paths Plan are to: 1) connect homes with workplaces, schools, public services, parks, greenspaces, neighbouring communities and the wider countryside; 2) form a safe framework for sustainable travel and informal outdoor recreation; 3) improve the quality of life of Glasgow's residents and visitors; and 4) help make Glasgow a healthier more sustainable city. Taken in the round, these objectives support the use of sustainable transport modes to access employment, community activities and recreation. In this context, delivery of the Core Paths Plan has potential to support a range of objectives including health, air quality, climate change and sustainable development.

Estimated annual mean background NO2 concentration (2002-2004) $\mu\text{g m}^{-3}$

*NO2: nitrogen dioxide; $\mu\text{g m}^{-3}$: microgrammes per cubic metre.
The statistic reported is a population weighted average mean concentration
(averaged over the three years 2002-2004) in microgrammes per cubic metre.
Source: UK Air Quality Archive*



Compiled by NHS Greater Glasgow & Clyde
Source: Scottish Government & Glasgow City Council © Crown copyright. All rights reserved. Glasgow City Council 100023379, 2007



Figure 5.4 Estimated annual mean background NO2 concentrations in Glasgow and the surrounding area

(Source: GCPH, 2008)

Table 5.7 East cluster PPS and their potential environmental/ health implications

Provision	Potential environmental implications	Potential implications for human health
City Plan 2 (Glasgow City Council, 2009)		
<p>Summary: City Plan 2 (CP2) includes a distinct strategy for the Clyde Gateway area that forms part of the wider 'Metropolitan Growth Corridor' (see City Plan 2 sections 7.119 to 7.152). The aim is to 'regenerate the Clyde Gateway area as a vibrant and sustainable residential and business location'. The strategy recognises the fact that development constraints on many sites in the area create significant additional costs that inhibit new investment. As Glasgow's extant development plan, CP2 provides the overarching planning policy context that guides the various lower level planning frameworks and strategies including those applicable to the east cluster. As such, many of CP2's provisions for the Clyde Gateway area will be delivered through the lower level PPS outlined below.</p>		
<p><i>Key provisions under the topic of 'Environment':</i> The Council will promote action to reduce the extent of vacant and derelict land, including the remediation of contaminated land The Council will seek to enhance the quality and biodiversity of the green network</p>	<ul style="list-style-type: none"> • Soils & soil quality/ Material assets: CP2 recognises that vacant/ derelict and contaminated/ potentially contaminated land is a major issue in the Clyde Gateway area. Over and above remediation strategies already in place (e.g. for the Athletes' Village, NISA/ Velodrome and Oatlands New Neighbourhood sites), the Council is sourcing funding from the Scottish Government and the Vacant and Derelict Land Fund for the selective treatment/ restoration of sites. This strategy is likely to result in a sustained reduction in the number of contaminated sites over the lifetime of the plan and also the bringing back into use of the area's vacant and derelict sites • Wildlife conservation & ecosystem services: CP2 highlights the quality of the existing greenspace network in the area whilst recognising that there are significant opportunities for its improvement. CP2's wider strategy for green network is to use new development as a driver for green network enhancement including development of new areas of greenspace and enhancement of links to the existing network. In particular, green network enhancements should be designed to support biodiversity as well as recreation and access objectives. Given this, green network provision within the Clyde Gateway area is likely to be improved over the lifetime of the plan. This will be supported by the EELDS and the Clyde Gateway Green Network Strategy 	<ul style="list-style-type: none"> • The proximity of people's homes to vacant/ derelict land and contaminated land sites are key indicators of how local environmental quality can impact on people's health and well-being. As more of these sites are remediated and brought back into use, there is potential for health improvements in the local population (not least through the increased availability of facilities and services developed on the previously vacant/ derelict and contaminated sites) • Increased provision and accessibility of a range of quality greenspace (e.g. parks and gardens, amenity greenspace and accessible natural/ semi natural habitat) can encourage people to engage in more outdoor recreational activity/ exercise. This in turn may contribute to improvements across the types of health issue identified in section 5.2.2.
<p><i>Key provisions under the topic of 'Transport and Accessibility'</i> Support the development of road</p>	<ul style="list-style-type: none"> • The planned growth (in terms of jobs, population, housing provision etc) in the Clyde Gateway area will give rise to a range of new travel demands. This increased demand has potential to create 	<ul style="list-style-type: none"> • An increase in traffic in the area would contribute to increased air pollution. In turn, this has potential to aggravate existing air quality issues

Provision	Potential environmental implications	Potential implications for human health
<p>schemes that assist the redevelopment of the Clyde Gateway area</p> <p>Ensure the incorporation of pedestrian and cycle paths into new development and their linkage to other paths in the network where appropriate</p>	<p>tensions with a range of environmental objectives. Unless this increased demand can be decoupled from increased private car usage, tensions may be particularly acute in relation to air quality objectives. CP2's Clyde Gateway strategy includes a range of provisions that aim to address this transport challenge</p> <ul style="list-style-type: none"> • Air quality, noise & dust: The increased capacity provided by the M74 extension and EERR have potential to reduce pressure on local areas within the area. This may decrease congestion in key areas and contribute to improved local air quality (e.g. at Parkhead Cross) • Material assets: CP2 recognises that in the interests of sustainability and environmental protection, many of the trips generated by new development in the Clyde Gateway area will have to be undertaken using public transport modes and/ or walking or cycling. Incorporation of pedestrian/ cycle paths and/ or transport assessment and travel plans with new development has potential to encourage people to use sustainable modes and minimise the environmental impact of additional transportation demand 	<p>and generate new ones. Whilst there is no data currently available on health problems caused by air pollution in the east cluster area, increased air pollution may adversely affect people with chronic lung/ respiratory problems and/ or aggravate allergic conditions (e.g. hay fever during summer months). Conversely, any decrease in traffic on local roads may improve air quality with the associated health benefits</p> <ul style="list-style-type: none"> • Provision of new pedestrian and cycle paths may encourage more people to walk/ cycle to work (already high in the east cluster area – see Table 5.6) with the associated health and wider environmental benefit. In addition, a well planned increase in path provision may remove some of the physical 'barriers' to accessing outdoor recreation/ exercise opportunities
<p>East End Local Development Strategy (Glasgow City Council, 2007)</p> <p>Summary: the East End Local Development Strategy (the EELDS) aims to 'create a vibrant, modern city district, through a regeneration process based on reinvention and reconnection'. In particular, the EELDS has the following objectives: 1) to create environments offering a sense of place, vibrancy and local identity; 2) to develop and maintain a quality green network offering safe, stimulating, healthy environments; 3) to ensure accessibility to local services; and 4) to invest in a fully integrated transport network. Effective delivery of these objectives has potential to support improvements across a range of environmental issues that can have a significant impact on health. The EELDS provides the planning framework for the Glasgow side of the Clyde Gateway area. It feeds into City Plan 2 and provides the statutory planning policy for the area.</p>		
<p><i>Section 2.3: the Urban Design Policy Framework</i></p> <p>This part of the EELDS sets out GCC's policy on high quality urban design for the EELDS area. In particular, the Council</p>	<ul style="list-style-type: none"> • Landscape & the historic environment: The EELDS objective is to create two Heritage Zones, covering those parts of the East End that display a reasonably intact and robust historic urban form. These zones will be related to Parkhead Cross Conservation Area and Bridgeton Cross. They have a variety of useable spaces and buildings of positive, distinctive character and quality which tend to 	<ul style="list-style-type: none"> • The key aim of the EELDS' Urban Design Policy Framework is to ensure that new development is in line with principles of good quality urban design accounting for local context. As outlined in section 5.2.2 however (see above), the majority of Calton and East Centre Local CPP area

Provision	Potential environmental implications	Potential implications for human health
<p>recognises the following as key aspects of urban design: Appreciating the context Creating the urban structure Making the connections Detailing the place</p>	<p>be from the Edwardian and Victorian eras. Change within these zones will be managed to ensure a considered approach to any demolition, alteration, or new development. Only the highest quality of design will be accepted within these zones, and particular emphasis will be placed on approving proposals where the design of the development proposals will support and add value to the area's special characteristics, such as listed buildings, important public views, landscape features and important skylines.</p> <ul style="list-style-type: none"> • Wildlife conservation & ecosystem services: the EELDS' objective of 'well-designed' places includes specific policy on land use, biodiversity, climate change, green infrastructure and surface water drainage. By integrating these broader considerations into the delivery of 'well designed' places, the EELDS' urban design policy framework has potential to support a range of biodiversity objectives across the east cluster area, especially in relation to green network provision. This in turn may contribute to increased habitat connectivity and the associated benefits in terms of ecosystem resilience • Air quality, noise & dust: the EELDS' 'making the connections' objective includes a range of provisions to ensure that urban design improves the connections/ transport options between adjoining areas and the strategy's area as a whole. This may encourage increased uptake of sustainable modes (including walking/ cycling) with the associated benefits of decreased air pollution. Despite this, any benefit here may be countered by increased population/ transport demand within the wider Clyde Gateway area (see above) 	<p>residents are reportedly happy with the overall quality of their neighbourhood environment. Given this, there seems to be limited scope for EELDS policy here to contribute to improvements in community perceptions of local environmental quality (with the associated health orientated benefits such as increased civic pride)</p> <ul style="list-style-type: none"> • Despite the above and as outlined in section 5.2.2 also, many of the key health issues in east cluster communities can be linked, to a degree, to the uptake of appropriate exercise (e.g. coronary heart disease and Cerebrovascular disease). Given this, EELDS policy here in relation to improved connections, movement, transport and walkability options may, through improved access, encourage more people to participate in appropriate levels of exercise (with the associated health benefits, particularly in relation to heart disease, vulnerability to strokes etc)
<p><i>Section 2.6: the Green Network</i> The Council have adopted a strategic approach to green network provision in the EELDS area. The Council will work with developers to secure the</p>	<ul style="list-style-type: none"> • The EELDS includes provision for a 'potential' green network including a range of greenspace, green links and civic spaces. Where appropriate, 'green links' may be accessible to people as part of Glasgow's Core Path network. EELDS Policies 17 and 18 require developers to demonstrate 1) how their proposals 	<ul style="list-style-type: none"> • EELDS green network policy has a range of potential health implications for east cluster residents, primarily in relation to improved accessibility • The EELDS 'potential green network' outlines a

Provision	Potential environmental implications	Potential implications for human health
<p>development of the green network, as part of the planning process, supported by detailed policy guidance in CP2 and EELDS.</p>	<p>contribute to generic green network policy from CP2 and the Scottish Planning Policy series; and 2) how their proposals will contribute to wider green network provision including, where relevant, improvements to the core path network in the area and related infrastructure e.g. signage, lighting etc.</p> <ul style="list-style-type: none"> • Wildlife conservation & ecosystem services: given the EELDS' stringent policy outlined above, green network provision within the strategy area is likely to be enhanced during the lifetime of the plan. Increased connectivity of the green network has potential to increase the dispersal range of key species and improve species resilience to a range of different pressures, including climate change and invasive non-native species. This effect may be particularly strong with respect to increased connectivity of well managed natural/ semi-natural habitat sites. In addition, local residents and community groups in the Calton/ Bridgeton area have expressed an interest in developing local greenspace projects which the Council supports. Development of these types of project can increase the coverage of the green network in the east cluster area and, through community driven management of local greenspace, may decrease the management burden on Council resources • Material assets: given the broadened scope of EELDS green network policy outlined above, there is substantial potential for an improvement in various aspects of walking/ cycling infrastructure provision during the lifetime of the plan e.g. core paths, lighting, benches, signage etc 	<p>number of 'green links'. As well as supporting biodiversity objectives, these proposed routes would provide ready access to the area's existing green space. As outlined elsewhere, improved accessibility may contribute to increased uptake of appropriate exercise. In addition to access, proposed new routes may provide a pleasant walk/ cycle in their own right which, as above, may encourage more people to take up exercise/ healthier lifestyles</p> <ul style="list-style-type: none"> • As outlined in section 5.2.2 (see above), a key barrier to outdoor exercise in the Parkhead/ Dalmarnock area may be the relative lack of publicly accessible greenspace (in contrast to Calton/ Bridgeton for example). The EELDS' proposed strategy for green network provision within the Parkhead/ Dalmarnock area (over and above a broad range of 'green links') is focused on improving cross river access to the Cunningar Loop. One alternative or indeed an additional project subject to funding may be to develop and/ or enhance existing sites north of the river (e.g. the large site immediately adjacent of the Clyde to the west of Dalmarnock Road)
<p><i>Section 2.7: the Movement Network</i></p> <ul style="list-style-type: none"> • The Council recognises that provision of a quality movement network is reliant on full integration between 	<ul style="list-style-type: none"> • Air quality, noise & dust: as outlined elsewhere in this Table, the EELDS' policies have potential to reduce transport related air pollution by increasing the attractiveness of other modes including walking/ cycling and public transport. Despite this, the planned increase in population and industry/ business in the area may contribute to increased transport demand to the extent that any air 	<p>As above</p>

Provision	Potential environmental implications	Potential implications for human health
<p>road, public transport, pavement/ paths and cycle route networks. A key focus of the movement network is on access as opposed to transport per se – this approach supports the objective of reducing the need to travel, particularly by private car</p> <ul style="list-style-type: none"> Recognising that the development of a fully integrated movement network will take some time, the Council has developed some basic priorities for a long term movement network action plan: 1) new key path routes; 2) improvements to existing key path routes; and 3) investment in new public transport infrastructure, especially at existing or new local train stations 	<p>quality benefit is effectively ‘cancelled out’. Whilst the EELDS’ transport strategy includes provision for substantial investment in public transport related infrastructure, a key element of the strategy is the development of new and enhancement of existing key paths in the area. Given this, the success of the strategy will depend, to a degree at least, on the substantial uptake of cycling and walking transport options</p> <ul style="list-style-type: none"> Material assets: over the course of the strategy’s lifetime there are likely to be substantial improvements in transport infrastructure provision. In particular, improvements can be expected in relation to the new and upgraded rail stations and new and enhanced core paths. Whilst the EELDS provides the overarching policy framework for these provisions, the individual projects are likely to be delivered as a part of several Glasgow wide and national PPS 	

The east cluster area includes several existing core paths and a small number of aspirational core paths. Many of the east cluster area core paths link residential/ community centres with the Clyde Walkway (also a core path) which provides ready access to the city centre and other services including Glasgow Green. Despite the relative ease of access afforded by the Clyde Walkway, it is underused as a key route for pedestrian/ cycle access to the city centre and other services due to concerns about safety, low levels of 'self policing' and evidence of anti-social behaviour. A recent report commissioned by GCV Green Network identified a range of barriers for community and recreational access to the Clyde Corridor, primarily within Glasgow¹⁵. Within the Clyde Gateway area, key barriers to use included:

- **Surface and steps:** tarmac surface breaking up due to tree roots in a number of places;
- **Width restrictions:** in some parts, there is an issue with tree encroachment where existing trees are enclosing the path and obscuring the view of the river;
- **Signage:** there are issues with signage along much of the Clyde Gateway section;
- **Vandalism:** the section of the walkway up river of Glasgow Green has an unkempt appearance with some of the adjacent walls covered in graffiti; and
- **Lighting:** up stream of Glasgow Green, the walkway has no lighting. Combined with the enclosed nature of the walkway at along much of the Clyde Gateway section, this is regarded as a key barrier to use – particularly during winter months.

The study referenced above includes a number of objectives and proposals to improve community and recreational access to the Clyde Corridor through the Clyde Gateway area. Where relevant, these proposals have been considered during the development of SEA recommendations to improve the CG Strategy and Framework's environmental performance, particularly in relation to the east cluster pre-games and legacy provisions.

As outlined in Glasgow's Core Paths Plan, paths designated as 'Core Paths' are likely to benefit from good maintenance and signposting and should be free from obstructions. In addition, most Core Paths should be open to people of all abilities. Given this, it is likely that commitments made within the Core Paths Plan will help to remove some of the Clyde Walkway's barriers to use outlined above. This in turn may encourage increased use/ outdoor recreational activity with the associated health benefits outlined elsewhere in this section.

5.3 Wildlife conservation & ecosystem services

Whilst the east cluster area is of limited importance in terms of national and local statutory conservation designations, the area is highly significant in terms of its green network resource. GCC describe green network as 'the linking together of natural, semi natural and man made open spaces to create an interconnected network that provides opportunities for physical activity, increases accessibility within settlements and to the surrounding countryside while enhancing biodiversity and the quality of the external environment' (GCC, 2009). In marked contrast to the objectives of natural heritages sites which seek to protect habitats and species on the basis of their rarity, the importance of green network lies in the integrity and resilience of the network as a whole and the ecosystem services it provides. In this context, the effective provision of green network can support a range of objectives over and above biodiversity protection and enhancement including human health and recreation, climate change adaptation and mitigation and air quality.

¹⁵ See the Clyde Corridor Community and Recreational Access Survey Report available at <http://www.gcvgreennetwork.gov.uk/>

The importance of east Glasgow's green network is reflected in the provisions of several key Glasgow wide and Glasgow east specific PPS. The EELDS includes specific strategy and policy on green network considering it as '...the foundation for the delivery of the integrated infrastructure approach...' (GCC, 2007). In addition, a comprehensive Green Network Strategy has been developed for the Clyde Gateway area which aims to ensure that the '...Green Network will be developed as an integrating element of Clyde Gateway, delivering a broad range of environmental and quality of life benefits to Glasgow and South Lanarkshire, helping to bring about regeneration and economic development' (LUC, 2007). As such, the CG Strategy and Framework raises a key opportunity to deliver against green network objectives from a range of PPS. Planning policy from City Plan 2 and the EELDS requires new development to work with and enhance existing green network provision. Given the scale of pre-games development activity in the east cluster area and the importance of Games legacy, a key issue for the SEA to address is the identification of realistic opportunities whereby Games related projects can deliver a substantial improvement in green network connectivity and resilience in the east cluster area.

5.3.1 Statutory and non-statutory conservation designations

Although limited in terms of its statutory conservation designation resource, the east cluster area is none the less home to several key sites including SINC's of city-wide and local importance and several SSLIs (see section 4.3.1 for further information on these designations). A list of these sites and other relevant information is provided in Table 5.8.

Table 5.8 East cluster conservation designations

Site	Area and distance from nearest Games venue	Additional information
C-SINC's and L-SINC's		
River Clyde (C-SINC)	The River Clyde is immediately adjacent to the Athletes' Village and Glasgow Green Hockey Centre sites	N/A
Richmond Park (L-SINC)	100m south of the Glasgow Green Hockey Centre on the south side of the River Clyde	N/A
SSLI		
Tollcross Park	Tollcross Park has an area of 37Ha. The Tollcross Aquatics Centre occupies part of Tollcross Park	Tollcross Park is internationally famous for its unique Rose Garden and impressive Winter Gardens. The park is located in the heart of Glasgow's East End approximately 3 miles east of the City Centre
Glasgow Green	Glasgow Green has an area of 55Ha and will be occupied by the proposed Glasgow Green Hockey Centre in its south eastern sector	Glasgow Green is by far the oldest of the city's parks, is situated within walking distance of the city centre east of the Saltmarket and comprises extensive open spaces with modern play facilities and several historic sites
Richmond Park	See above	N/A
Southern Necropolis	The Southern Necropolis SSLI is located approximately 320m south of Glasgow Green on the south side of the River Clyde	The Southern Necropolis SSLI is home to one of Glasgow's waymarked 'heritage trails'

Site	Area and distance from nearest Games venue	Additional information
Old Rutherglen Road	The Old Rutherglen Road SSLI is located approximately 225m west of Glasgow Green on the south side of the River Clyde	N/A

5.3.2 LBAP habitats and species

The River Clyde is a key habitat under the LBAP's 'Rivers and Streams' local Habitat Action Plan (HAP). Furthermore, the stretch of the Clyde running through the east cluster area is known to support otters (*Utra Utra*) which are covered by a Glasgow LBAP local Species Action Plan (SAP). Table 4.8 in section 4.3.2 summarises some of the key pressures and threats affecting river habitats and otters in Glasgow and outlines some of the LBAP actions supporting their protection and recovery.

5.3.3 Green network

As outlined in section 4.3.3, the GCV Green Network partnership has identified a range of aspirational outcomes that green network development and enhancement may hope to achieve. Amongst others, key aspirational outcomes of relevance to the CG Strategy and Framework and, more specifically, the environmental baseline and issues in the east cluster include:

- Better living environment;
- Access to recreational greenspace;
- Improved visual amenity;
- Active lifestyles;
- Clean greenspace;
- Mental wellbeing;
- Climate change (mitigation and adaptation);
- Flood management;
- Habitat networks;
- Landscape quality;
- Water quality;
- Land remediation;
- Green jobs;
- The attraction and retention of businesses; and
- Green travel.

The Clyde Gateway Green Network Strategy (LUC, 2007) identifies a range of challenges and issues in relation to the current provision of green network in the Clyde Gateway area (and therefore a considerable portion of the east cluster area). In particular, the strategy notes that the Clyde Gateway area contains some 30% of all derelict and potentially contaminated land in Glasgow and South Lanarkshire which provides an indication of the condition of much of the greenspace in the area i.e. it is land left over from historic demolition (Figure 5.3 shows greenspace provision in the GCPH 'Glasgow East' area). In effect, existing greenspace in the area has little functionality and/ or it is not fit for the purpose it was originally designed or that required by local peoples' current needs. The strategy also notes the following:

- **Green network land use categories:** the largest single defined land use in terms of green network in the Clyde Gateway area is 'open semi-natural' space. The largest areas defined as 'open semi-natural' are located at the Cuningar Loop, and at the eastern end of the site adjacent and to the south of London Road. The London Road site is zoned for development as industry/ business in the City Plan and the greenspace at the steelworks will be significantly reduced in size by the development of the M74 extension; and

- **Vacant and derelict land:** many green network sites in the Clyde Gateway area classified as ‘open semi-natural’ spaces are in fact vacant and derelict land sites. In general, these sites do not provide any significant amenity, landscape or biodiversity value to the area. This kind of low quality greenspace has a significant negative impact on the overall quality of the environment (LUC, 2007).

In summary, whilst there is a large amount of ‘green space’ in the Clyde Gateway area, its overall quality is poor with little sense of network. Instead, green space is fragmented, derelict, underused and under performing. Despite these issues and challenges, there is substantial potential and indeed political will for green network development and enhancement to be a key part of the wider strategy for regeneration in the Clyde Gateway and wider Glasgow east area. In particular, the Clyde Gateway Green Network Strategy has identified a vision for green network provision based on multi-purpose greenspaces that provide areas for recreation and biodiversity whilst supporting a range of more functional objectives such as walking and cycling routes and SuDS infrastructure. The strategy for green network within the EELDS builds on this vision by identifying a substantial number of potential ‘green links’ that will enhance access provision in the area (many green links align with the core paths network in the area – see section 5.2.3) whilst supporting a range of other objectives.

Given the various strategies for green network development and enhancement in the east cluster area, it is foreseeable that green network provision will improve over the coming years, particularly during the lifetime of the Clyde Gateway URC and City Plan 2 strategies (up to 2020). A key issue for the SEA to address has been to identify opportunities and synergies whereby the CG Strategy and Framework can support the delivery of green network objectives in the area. Table 5.9 outlines some of the key green network objectives, policies and proposals of relevance to the east cluster area and the opportunities these raise for the ongoing development of the CG Strategy and Framework. These opportunities and others have been considered in the development of SEA recommendations.

Table 5.9 Green network opportunities and issues to consider in the east cluster area

Related objective, policy or proposal	Potential opportunity and/ or issues for the CG Strategy and Framework to consider
<p>SuDS Provision Relevant PPS: City Plan 2, EELDS, Clyde Gateway Green Network Strategy</p>	<ul style="list-style-type: none"> • A 2007 report by Hyder Consultants informing the Clyde Gateway Surface Water Management Plan identified flood risk across the Clyde Gateway area and highlighted the benefit of developing SuDS schemes on a regional as opposed to site-by-site basis. Adopting such a ‘regional’ approach would result in the development of a series of SuDS ponds across the area to which surface flow would be directed in a managed way (LUC, 2007) • Any development of CG Strategy and Framework environmental enhancement and/ or legacy projects should consider the degree to which they can support a Clyde Gateway/ east cluster wide strategy for the provision of SuDS ponds. A key additional benefit of developing drainage provision in this manner is the creation of additional green/ blue spaces with potentially high amenity and landscape value • The Hyder report recognises the Dalmarnock area as having the greatest capacity for regional SuDS schemes. This is recognised in the Clyde Gateway URC’s South Dalmarnock Masterplan
<p>Green network integration Relevant PPS: Glasgow and Clyde Valley JSP, City</p>	<ul style="list-style-type: none"> • The Clyde Gateway Green Network Strategy recognises that the Clyde Gateway green network needs to be considered in the wider context of the GCV Green Network area • Any development of CG Strategy and Framework environmental enhancement/ legacy projects should have regard to the degree to which they support

Related objective, policy or proposal	Potential opportunity and/ or issues for the CG Strategy and Framework to consider
Plan 2, Clyde Gateway Green Network Strategy	integration of the local green network with the wider Glasgow city and GCV green networks
Green network provision along the River Clyde Corridor Relevant PPS: Clyde Gateway Green Network Strategy	<ul style="list-style-type: none"> Accounting for the historic decline in industry and high number of vacant and derelict sites adjacent to the Clyde, the Clyde Gateway Green Network Strategy recognises the importance of restabilising the Clyde corridor as a regionally significant green network resource. In particular, the strategy highlights the importance of using the river corridor to connect key elements of the green network both within and adjoining the Clyde Gateway project area. Other objectives include developing the river corridor as a key access and recreational resource (i.e. Clyde Walkway/ NCR 75) and as a key biodiversity resource There is a key opportunity for the CG Strategy and Framework to contribute towards the delivery of these objectives whilst further adding to the environmental and socio-economic legacy of the Games. In particular, the SEA should support the identification of realistic opportunities whereby 1) increased access to the river from adjoining areas can be provided; 2) in line with the GCV Green Network Partnership Integrated Habitat Model, identify opportunities for conserving and enhancing biodiversity along the river corridor through provision of links to other elements of habitat networks; 3) the profile of the river and Clyde Walkway in the area can be improved as a route and recreational resource e.g. through branding, signage and way-marked trails; and 4) new and/ or enhanced open spaces adjacent to the river corridor can be developed.
Green network links Relevant PPS: EELDS and Clyde Gateway Green Network Strategy	<ul style="list-style-type: none"> Both strategies identify a potential network of green links that help to link communities, existing or potential open spaces and potential regional SuDS facilities whilst enhancing key transport routes. In line with strategy for the Clyde Corridor outlined above, these links would facilitate access to the river from the wider urban area. In addition, it is anticipated that green links may provide a framework for the development of more local spaces and guide the design of public realm in areas connecting strategic open spaces One of the Clyde Gateway Green Network Strategy's proposed green links runs through the east cluster area between Glasgow Green, Dalmarnock, passing through the Athletes' Village before crossing the river to the Cuningar loop. In addition, the EELDS identifies a range of green links, particularly in the south Dalmarnock area This proposed network raises a key opportunity for the CG Strategy and Framework to work towards its various environmental commitments and objectives. Given the scale of pre-games development activity in the area, there is potential for a strategic approach to Games related green network, green link and SuDS provision. In particular, a key issue for the SEA to address will be the identification of opportunities whereby the landscape, SuDS and biodiversity strategies of individual east cluster pre-games built development projects may be effectively 'joined-up' to deliver a synergistic green network provision effect i.e. small additional projects may be recommended that enhance the cumulative benefit over and above that of the individual projects. This may be a particularly key opportunity in relation to SuDS provision
Strategic Green Network Spaces Relevant PPS: Clyde Gateway	<ul style="list-style-type: none"> The Clyde Gateway Green Network Strategy proposes three new 'Strategic Green Network Spaces' at Dalmarnock Riverside (a site adjacent to the river and due west of Dalmarnock Road), Dalmarnock Cross and Sports Village (around the NISA/ Velodrome site). The strategy outlines how these projects would

Related objective, policy or proposal	Potential opportunity and/ or issues for the CG Strategy and Framework to consider
Green Network Strategy	<p>support objectives across a range of policy areas including recreation/ access, biodiversity protection and enhancement and flood risk management. The Sports Village and Dalmarnock Cross projects are not 'greenspace' projects as such but will comprise hard and soft landscaping and provide access to surrounding communities, green links and greenspace. The Dalmarnock Cross and Dalmarnock 'Riverside Park' Strategic Green Network space projects have been incorporated with the development of Clyde Gateway URC's South Dalmarnock Masterplan and will be progressed as part of this wider project</p> <ul style="list-style-type: none"> • Landscaping, SuDS and biodiversity strategies as part of the NISA/ Velodrome project should have regard to the objectives and scope of the Sports Village project. In addition, the Dalmarnock Riverside Strategic Green Network project raises a key opportunity for the CG Strategy and Framework to work towards its various environmental commitments and objectives. Given that this project falls within the geographical scope of the proposed Commonwealth Games Riverside Project, integrating the two may contribute to an enhancement of the overall benefit, particularly with regard to SuDS provision (the Green Network Strategy project is also a proposed location for a regional SuDS scheme) and improving links between fragmented elements of habitat networks

A recent study commissioned by the GCV Green Network partnership reviewed ecological connectivity and habitat quality along the River Clyde to provide costed proposals for the reversal of habitat fragmentation through: 1) identification of opportunities to increase habitat connectivity; 2) the protection and enhancement of existing biodiversity value; and 3) the creation of new habitat. The outputs of this study identified a range of biodiversity opportunities that further highlight the strengths of the Clyde corridor in terms of its biodiversity and wider green network value. This in turn highlights potential opportunities that the ongoing development of the CG Strategy and Framework should consider in fulfilment of its environmental commitments. In addition, the study highlights barriers to effective biodiversity management along the Clyde corridor including fragmentation of control and responsibility, funding provision for capital intensive projects and a lack of training and communication to those delivering management on the ground (EnviroCentre, 2008). These issues raise a key opportunity for the CG Strategy and Framework (certainly within the context of specific pre-games development clusters) to incorporate a strategic approach to biodiversity management within an overall strategy for green network provision. Findings from the study referenced here have played a key role informing the development of SEA recommendations; particularly those related to pre-games development green network/ biodiversity enhancements.

5.4 Water bodies & flooding

Water quality in the east cluster, both from a point source pollution and ecological perspective, has been improving year on year as is common with the rest of the City. Main areas of flood risk are located around the Cuningar Loop, adjacent to the Athletes' Village, Rutherglen Bridge and towards Cambuslang further to the east.

The drainage of surface water is a significant issue in the East End. The 100 year event which occurred in July 2002 caused widespread flooding across Glasgow and in particular the east end. The flooding became the catalyst for the development of a series of water management plans including the Clyde Gateway integrated Water Plan.

5.4.1 Local plans, policies and strategies

The improvement in water quality across Scotland can be attributed mainly to the *Water Framework Directive (WFD)* and the subsequent *Scotland River Basin Management Plan* that was developed by SEPA in response to the requirements of the WFD. At a local level the City Plan 2 has a number of environmental policies that are concerned primarily with the water environment and flood risk. These are outlined below:

- **South Dalmarnock Masterplan;**
- **Clyde Gateway Brochure;**
- **East End Regeneration Route;**
- **City Plan 2 Policy ENV17:** Protecting the water environment: to ensure new development does not have an adverse impact on the water environment by preventing the deterioration of aquatic ecosystems and enhancing their quality, including groundwater, promoting sustainable water use, reducing pollution and mitigating against the impact of severe weather events;
- **City Plan 2 Policy ENV4:** Sustainable drainage systems (SuDS): To ensure satisfactory sustainable measures are provided for the management and safe disposal of surface water run-off; and
- **City Plan 2 Policy ENV5:** Flood prevention and land drainage: to safeguard development from the risk of flooding and to ensure new development does not have an adverse impact on the water environment, does not materially increase the probability of flooding elsewhere and does not interfere detrimentally with the storage capacity of any functional flood plan or associated water flows.

5.4.2 Water quality

River Clyde (North Calder to Tidal Weir)

SEPA have classified this water body as having an overall status of Bad Ecological Potential with Medium Confidence in 2008 with overall ecological status of Bad and overall chemical status of Fail. Environmental objectives have been set by SEPA for this water body over future river basin planning cycles in order that sustainable improvements to its status can be made over time, or alternatively that no deterioration in status occurs, unless caused by a new activity providing significant specified benefits to society or the wider environment. For this water body SEPA have set the overall environmental objectives for the first, second and third River Basin Management Planning cycles as:

- 2008: Bad ecological potential;
- 2015: Bad;
- 2021: Moderate; and
- 2027: Good.

Molendinar Burn

SEPA have classified this water body as having an overall status of Bad Ecological Potential with Medium Confidence in 2008 with overall ecological status of Bad and overall chemical status of fail. Environmental objectives for this water body over future river basin planning cycles have been set in order that sustainable improvements to its status can be made over time, or alternatively that no deterioration in status occurs, unless caused by a new activity providing significant specified benefits to society or the wider environment. For this water body SEPA have set the overall environmental objectives for the first, second and third River Basin Management Planning cycles as:

- 2008: Bad ecological potential;
- 2015: Bad;
- 2021: Poor; and
- 2027: Good.

Tollcross Burn

SEPA have classified this water body as having an overall status of Poor Ecological Potential with Medium Confidence in 2008 with overall ecological status of Poor and overall chemical status of Pass. Environmental objectives for this water body over future river basin planning cycles have been set in order that sustainable improvements to its status can be made over time, or alternatively that no deterioration in status occurs, unless caused by a new activity providing significant specified benefits to society or the wider environment. For this water body SEPA have set the overall environmental objectives for the first, second and third River Basin Management Planning cycles as:

- 2008: Poor ecological potential;
- 2015: Poor;
- 2021: Poor; and
- 2027: Good.

5.4.3 Flood risk

The main flood risk within the east cluster area comes from severe weather events causing flooding within the town due to inadequate surface drainage, and from the River Clyde. Despite being upstream from the tidal weir flooding can still occur on this stretch of river as seen in July 2002.

Flood mapping showing the potential extents of flooding during 1 in 100 and 1 in 200 year events (see Appendices H and I) for the east cluster area demonstrates that the Athletes' Village site could be at risk from flooding given the current flood defences that are in place. Glasgow Green does not appear to be at particular risk from extensive flooding given its location on higher ground above the river, and the NISA and Velodrome sites lie away from main watercourses and will also have integrated SuDS incorporated into them thus reducing the risk of extensive flooding in the event of severe weather events. Tollcross Burn runs through Tollcross Park, although using flood prediction mapping it would appear that flooding is also not a major issue here.

5.4.4 Hydromorphology

Aquatic habitats, watercourses and coastal areas are often modified physically to facilitate better use for people of land and/ or water. These modifications are often as a result of historical, current and planned engineering works such as drainage of land for development and port developments/ construction of coastal defences to prevent flooding or erosion (SEPA, 2005). Modifications to aquatic habitats can result in direct removal of habitat and changes in flow.

The key activities likely to affect hydromorphology in the Glasgow City area are historical engineering and urban development. Specifically, this relates to historical and potential future engineering works / development at along the Clyde. These are less evident within the east cluster, particularly upstream from the tidal weir on the Clyde, although the Molendinar Burn, Tollcross Burn and Camlachie Burn have all been heavily altered and culverted in parts over the years. The negative impacts of this are evident given the current quality of these water bodies outlined above.

5.5 Air quality, noise & dust

5.5.1 Air quality

The east cluster area contains one of Glasgow's three Air Quality Management Area (AQMAs) at Parkhead Cross (see Figure 5.5). The air pollutant of concern is NO₂. As shown in Table 5.10, the 2009 Air Quality Action Plan (AQAP) predicted exceedences of the 2005 objective for NO₂ at the Westmuir Street monitoring location.

Table 5.10 2006 and 2010 (predicted) NO₂ levels for the Parkhead Cross AQMA

Note: predicted exceedences are highlighted in bold red
(Source: Glasgow City Council, 2009)

Parkhead Cross AQMA monitoring locations	NO ₂ µg m ⁻³ (2005 objective level: 40 µg m ⁻³ annual mean)	
	2006	2010 Predicted
Westmuir Street	58	51

The area encompassed by the Parkhead Cross AQMA is depicted on Figure 5.5. This area is characterised by the convergence of five roads (Westmuir Street, Tollcross Road, Springfield Road, Duke Street and Gallowgate) with a mixture of commercial properties within mostly tenement buildings. Similarly to the city centre AQMA, the Parkhead Cross AQMA exhibits a number of air pollutant source/ receptor criteria e.g. narrow congested streets with residential properties close to the kerb and busy streets where people may spend one or more hours close to traffic. Given the density of Commonwealth Games activity in the vicinity of Parkhead Cross (e.g. NISA and Velodrome, Tollcross Pool, Athletes' Village etc), the potential effects on air quality in the area should be considered carefully with a view to minimising potential negative effects in the first instance (e.g. increased games-time and post-games traffic) and, failing that, identifying sustainable mitigation opportunities e.g. tree planting to enhance existing capacity for air pollutant attenuation, low emissions zones etc.

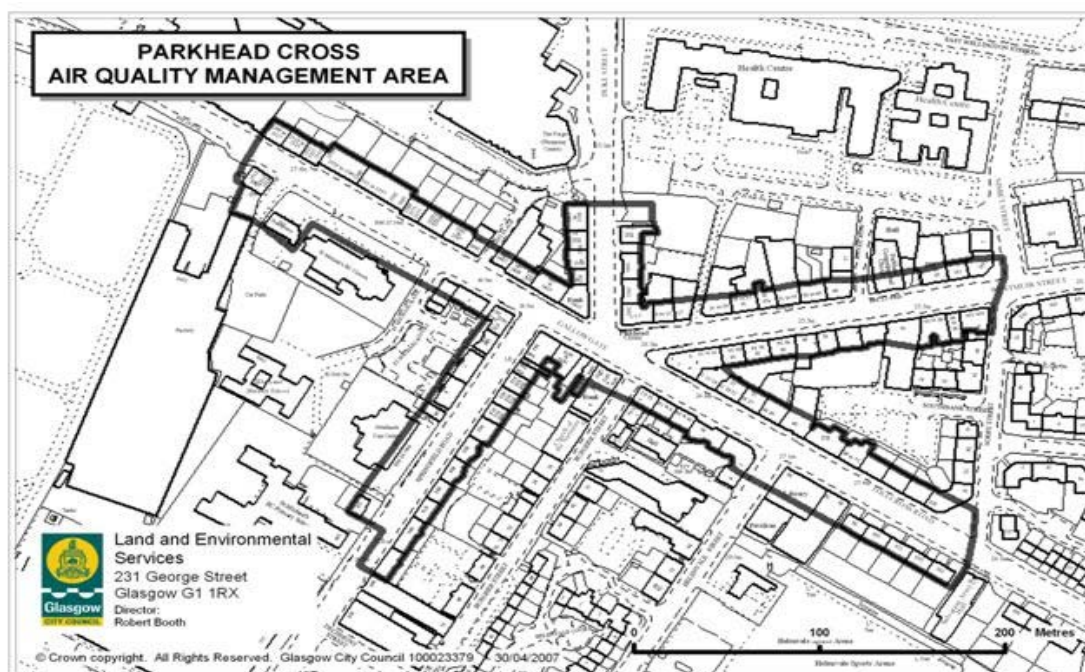


Figure 5.5 Parkhead Cross Air Quality Management Area

5.5.2 Road project related air quality issues

The forthcoming East End Regeneration Route (EERR) by definition runs through much of the east cluster area. In particular, the Bridgeton, Dalmarnock and Parkhead areas will be affected. An Environmental Impact Assessment (EIA) was prepared to accompany the EERR's planning application (Ironsides Farrar, 2004). The EIA identified likely impacts of the EERR during both construction and operational phases. In the context of air, these relate to construction phase generated dust nuisance and operational phase emissions of road transport source air pollutants.

Consideration of air related issues in SEA can be informed by relevant information from EIAs. EIA in this context can highlight how local air quality issues may be affected in light of changing pressures driven by the construction and operation of development projects, in this case a road project. The assessment of the potential effects of relevant east cluster provisions on air issues has been undertaken with consideration of changes in local air quality that have been predicted to occur as a result of the EERR's construction and operation. The EERR is being delivered in three phases with the road opening currently programmed for April 2012.

A summary of the EIA findings are provided below and have informed the SEA assessment of the CG Strategy and Framework. These findings are particularly important with respect to potential cumulative effects issues caused by the combination of EERR construction phase impacts with the potential environmental effects of the CG Strategy and Framework's pre-games development programme in the east cluster area. The review here has also helped to highlight potential future air quality issues and indeed opportunities that the operation of the EERR may generate and that the assessment of the CG Strategy and Framework's Games-time and post-games provisions should consider.

Summary of EERR air quality impacts (Source: Ironsides Farrar, 2004)

Impact	Impact significance	Comments
Nuisance dust during construction phase	Negligible/ low	Reduction of impact requires implementation of a best practice management protocol
Impact on residents of vehicle emissions after development is complete	Low	Existing roads will have a decline in traffic and therefore an improvement in air quality
PM ₁₀	Low – medium	Marginally above the 2010 objective

In addition to the summary information above, the following is also noted:

- Results for NO₂ emissions indicate that EERR operation is likely to result in incremental rises in annual mean concentrations for the majority of the monitoring sites considered. The highest represents an increase of 28% on baseline conditions. Annual mean emissions were predicted to fall at two sites and increases were also predicted at several sites under the 'do nothing' scenario. Although a large portion of increases were noted, none of the sites were predicted to breach the annual mean objective for NO₂ of 40 µg m⁻³. It should be noted however that the EIA of the EERR was undertaken prior to the announcement of Glasgow's successful bid to host the 2014 Commonwealth Games. The likelihood of increased traffic in the east cluster area both during and after the Games (due to Games-time operation and increased visitor numbers post-games) may contribute to increased emissions on the EERR and surrounding local roads over and above that predicted in the EIA (i.e. the cumulative effect of the EERR in combination with that of the various

Games related projects). In response, the SEA has taken a precautionary approach to consideration of NO₂ related air quality issues in the east cluster area;

- Results for PM₁₀ emissions indicate that the more stringent 2010 annual mean objective of 18 µg m⁻³ is likely to be exceeded at several sites. This is predicted to occur under both the 'do-nothing' and 'do-something' (development of EERR) scenarios. Despite this, the exceedence in all cases is only marginal (less than 1 µg m⁻³). PM₁₀ issues are predicted to be particularly key at the EERR's London Road and Carntyne Road junctions, both of which are in proximity of key Games venues and are on potential Venue Access Routes. In line with NO₂ issues discussed above, the SEA has taken a precautionary approach to consideration of PM₁₀ related air quality issues in the east cluster area.

5.5.3 Noise

The east cluster area contains one candidate Noise Management Area (NMA) designated for road traffic environmental noise at High Street (High Street Station) in the Merchant City area of Glasgow. Furthermore, Tollcross Park has been designated as a candidate Quiet Areas (QA). Please refer to Appendix G section 5.4 for further information on consideration of noise in the SEA of the CG Strategy and Framework.

5.6 Soils & soil quality

5.6.1 Contaminated land

Considering the fact that the East End was the powerhouse of Glasgow's industrial past it is not surprising to note that there is a considerable concentration of potentially contaminated land sites within the east cluster area. These are associated with the heavy industrial use of the East End, with contaminants ranging from heavy metals, chromium, nickel and fuel. There is a particular concentration of potentially contaminated sites around Parkhead and Dalmarnock.

5.6.2 Soil cleaning

The Athletes' Village is utilising a soil treatment centre (STC) which transforms what would have been waste soils into useable construction material, which will not only reduce the need for clean material, but will also lower the need for transportation and reduce the disposal of waste to landfill. The STC employs several different cleaning processes within a temporary facility without intrusive noise or smells. The contaminated soil is excavated and taken to the facility for treatment. How the soil is dealt with depends on what contaminants might be held within it, including heavy metals, nickel chrome or fuel. Treated materials are then reused for landscaping, fill material; or aggregate, which negates the need to buy in and transport clean construction material.

5.7 Landscape & the historic environment

Owing to the prevailing winds, many of Britain's Victorian cities located the more polluting industries eastwards, allowing those with sufficient wealth to enjoy the cleaner air of the west. However, it was as much industry, as the coming of railways, over-population and poverty that caused the focus of Glasgow to shift westwards in the mid-19th century, so that what is now considered to be the oldest parts of the East End, around the Cathedral, Bridgeton Cross and the Gallowgate, were originally part of the City Centre. The onset of industry in the east effectively began in the 1720s, with the exploitation by potteries of the Mount Bridge clay bed, which stretched from Glasgow Cross to Parkhead. By the mid-19th century cotton became the dominant industry, hence the likes of Muslin Street and Poplin Street in Bridgeton and Dalmarnock. After that cotton made way for engineering and steel works that would provide the shipbuilders in Govan with their

material. The largest forge in the City was in Parkhead, owned by William Beardmore, which covered 25 acres by 1896, and during the First World War employed 20,000 workers. Meanwhile Sir William Arrol's ironworks, founded in 1873 at Dalmarnock, employed around 5,000 workers and was responsible for engineering among others, the Forth Railway Bridge and London's Tower Bridge.

In addition to all this large, heavy industry, a large number of smaller enterprises operated; printers, leather works, chemical works, furniture makers and warehouses, all of which employed a large number of people who came to live in the East End, quite often in overcrowded and insanitary environments.

Over the years of industrial decline the area has suffered from a loss of its historic character through building demolition and piecemeal development, however it still retains a tangible element of its past, Parkhead Cross for example, as well as a less tangible but just as real, sense of community and shared heritage. Quite often the area could be considered to be the poor cousin of the West End, but there is just as much here in terms of surviving heritage assets that can benefit the area as a whole.

As with the other clusters, an area of 500 metres around each venue complex has been analysed and pertinent elements of the historic environment located around them identified. Further details concerning listed buildings, conservation areas, scheduled monuments and other cultural heritage assets outlined in this section are provided in Appendices G, H and I.

5.7.1 Local plans, policies and strategies

- **Changing Places, Changing Lives, East End Local Redevelopment Strategy:** outlines the Council's spatial strategy for the regeneration of the East End. Contains specific instructions on how the built heritage should be incorporated and enhanced/ protected.
- **Parkhead Cross Conservation Area Appraisal (Glasgow City Council):** sets out a statement of significance for the Parkhead Cross Conservation Area, and offers design guidance to developers to ensure that any works enhance and protect the character of the Conservation Area and its immediate environs.

5.7.2 Athletes' Village, NISA, Sir Chris Hoy Velodrome and Celtic Park

Given the close proximity of these venues to each other, they have been considered as a single entity for the purpose of this part of the assessment. Where potential opportunities and/ or constraints are identified which are specific to a single venue then this will be made clear. Within 500 metres of this complex of venues there are:

- 14 Listed Buildings – 11 Category B and 3 Category C(S); and
- 1 Conservation Area – Parkhead Cross.

The area around the venues is dominated particularly by the large stadium of Celtic Park to the north, and the larger tenement buildings to the east. There is little surviving that suggests the former industrial and residential past with the exception of London Road School and the Eastern Necropolis (both B Listed Buildings). Given the significant amount of clearance and open, brownfield sites within the cluster, it is clear there is the capacity to accommodate the new venues, which with associated infrastructure such as public realm works and ancillary buildings, will undoubtedly improve the current appearance and character of the area. There is also the clear opportunity to reconnect the area around the venues with the surviving historic

core around Parkhead Cross, with the provision of appropriate and well-designed public realm using hard and soft landscaping.

5.7.3 Glasgow Green

Glasgow Green is the oldest public open space in the City, and retains its historic character almost intact, with the People's Palace and Doulton Fountain, Nelson memorial obelisk and the Clyde Walkway being the main attractions for citizens and visitors alike. The Green is a well-used public open space, and will be one of the main routes for pedestrians and cyclists to make their way from the western parts of the City through to the Athletes' Village, NISA and Velodrome, utilising existing paths.

There are a large number of Listed Buildings within Glasgow Green, the majority of which are located within the main open space towards the City Centre, away from where the field hockey venue will be placed. However, it is important to consider Glasgow Green as a single historic open space. Within a 500 metre radius of the Green there are:

- 96 Listed Buildings – 20 Category A; 67 Category B; 9 Category C(S);
- 1 Scheduled Monument – Tollbooth Steeple; and
- 1 Conservation Area – City Centre.

The main focus of Commonwealth Games-related activity will be at the southern end of the Green, to the south of the football pitches, where the field hockey event will take place. This area is an attractive green area, which is currently well-managed and in good repair. There is little by way of potential constraints associated with townscape, landscape and cultural heritage assets, indeed there are many opportunities for the provision of new public realm areas associated with the venue that would likely have a beneficial impact on the area's overall current appearance.

This is located away from the bulk of the designated cultural heritage assets within 500 metres of Glasgow Green, however the area surrounding the field hockey venue still retains a large amount of historic character which is evidenced by the adjacent Category B Listed Buildings 97 – 113 Greenhead Street, 117-127 Greenhead Street, Buchanan House (formerly Greenhead School; and the Category C(S) Listed Buildings, King's Bridge and 67 – 73 Greenhead Street.

5.7.4 NISA and Sir Chris Hoy Velodrome

NISA and the Velodrome lie within an area of the East End that has seen significant changes in the last 30 years, and that has lost a large amount of its historic character. However, developments from the second half of the 20th century have defined this area, particularly the domineering stadium of Celtic Park which is an iconic representation of this part of the East End.

The venue sites have long been derelict, although some buildings belonging to the late 18th and early 19th centuries, including London Road School (Category B Listed) between the venues and Celtic Park, and a number of listed residential properties (mixture of B and C(S) Listed) on Fielden Street to the north-west of the venues and Helenvale Street to the east. Within a 500 metre radius of the two venues there are:

- 13 Listed Buildings – 11 Category B and 2 Category C(S); and
- 1 Conservation Area – Parkhead Cross.

5.7.5 Tollcross Swimming Pool

There will be some significant works within Tollcross Park, with the swimming pool extension being confined to the existing pool complex. However, within the Park there are a number of Category A and B Listed Buildings which form an integral part of the park's historic character, and this would need to be considered during the design of Games-related public realm and any other associated infrastructure associated with the swimming venue. Within a 500 metre radius of Tollcross Swimming Pool there are:

- 8 Listed Buildings – 1 Category A, 4 Category B and 3 Category C(S)

5.7.6 Conclusions

In general the area encompassed by the east cluster has the capacity for a significant amount of change that would benefit the area's built historic environment, and this is recognised in the East End Local Development Strategy. Commonwealth Games-related developments, ranging from the venues themselves, through to public realm and associated infrastructure works can go a long way to improving not only the overall character of much of the east cluster area but also connecting areas that are currently isolated due to large tracts of vacant and derelict land, and disjointed areas of housing and vacant buildings. In areas that retain a significant portion of their original historic character, such as Parkhead Cross and Bridgeton Cross, there are clear opportunities for the use of good-quality design and materials that can enhance these areas, and connect them to the rest of the surrounding area.

6. SOUTH CLUSTER, ENVIRONMENTAL OBJECTIVES, BASELINE AND CONTEXT

6.1 Introduction

The south cluster area takes in venues at Ibrox, Hampden and Cathkin Braes, and as such covers a large area containing a diverse mixture of urban residential and industrial areas, urban parkland and rural woodland. The location of each venue is shown in Appendices H and I and also Environmental Report Part A. The south cluster has a diverse natural and built environment, taking in the concentrated urban sprawl surrounding Ibrox and Hampden, through to the semi-rural areas surrounding Cathkin Braes at Castlemilk and Carmunnock.

6.2 People, health& access

In general, the health of south cluster residents, whilst worse than that of the average Scot across many health outcome indicators, is better than that of Glaswegians living in other parts of the City (e.g. communities encompassed by the east cluster area). As with other 'Community Health Partnership' areas however, the south cluster area exhibits distinct pockets of poor health thus highlighting the continuing trend in Glasgow of health inequality. Key areas of poorer health include the communities of Ibrox/ Kingston, Castlemilk and Toryglen. The remainder of this section outlines a range of population and human health baseline information and highlights key issues and opportunities that the ongoing development of the CG Strategy and Framework should consider.

6.2.1 Demographics

Population in the two Community Health Partnership areas encompassed by the south cluster has fallen slightly in recent years. Glasgow 'south west' has an approximate population of 116,000 (a drop of about 2,600 in the size of the overall population since the late 1990s) and Glasgow 'south east' has an approximate population of 100,000 (a drop of about 3,500 in the size of the overall population since the late 1990s). South west Glasgow's population is comprised of 18% children, 66% young and middle aged adults and 15% older people. There are 53,200 households in the south west Glasgow area. South east Glasgow's population is comprised of 17% children, 70% young and middle aged adults and 13% older people. There are 49,700 households in the south east Glasgow area (GCPH, 2008).

Proxy population statistics for the south cluster area as a whole and its constituent communities are shown in Table 6.1. Figures 6.1 and 6.2 show the two Local Community Planning Partnership (Local CPP) areas that are broadly encompassed by the south cluster area – Govan and Craigton Local CPP and Linn and Langside Local CPP.

As highlighted above, the population in the south cluster area is broadly stable albeit with a slight decline in recent years. Unlike other parts of the City (e.g. the Clyde Gateway project area within the east cluster), the strategy for population growth and/ or change in the south cluster area is largely limited to the Glasgow Housing Association (GHA) restructuring programme in east Govan/ Ibrox. The programme here consists primarily of demolition of defunct social housing stock as an approach to housing land release. At this stage in its development, it is not clear how many new houses will be built in east Govan/ Ibrox under the GHA restructuring programme or indeed whether the development will mark a net increase in the area's population.

Table 6.1 South cluster proxy population statistics

(Source: GCPH, 2008)

Community Planning Partnership area	Neighbourhoods encompassed	Population
South cluster total population (proxy): 55,416		
Govan and Craigton	Greater Govan	12,114
	Ibrox and Kingston	13,107
Linn and Langside	Carmunnock	1,269
	Castlemilk	14,544
	Kings Park and Mount Florida	9,382
	Toryglen	5,000

The 2003 non-statutory local development strategy for Castlemilk ('Changed for the better – the final steps to full regeneration') outlines the constraints to population change within the neighbourhood. Crucially, the strategy highlights how earlier plans had anticipated a Castlemilk population stabilising at around 20,000 people. Despite this, the constraints in the area and changes in approach to housing development (i.e. a move to providing for a range of house types, sizes and tenures) has led to Castlemilk's population stabilising at around 15,000 people. In addition, Comprehensive Planning Studies (CPS) undertaken during the development of City Plan 1 assessed the long term development potential and environmental capacity at six key green field areas across the city including a site at Castlemilk/ Carmunnock. Three of these sites are now the 'Community Growth Areas' outlined in City Plan 2 (Broomhouse/ Baillieston/ Carmyle, Easterhouse/ Gartloch and Robroyston/ Millerston). The site at Castlemilk/ Carmunnock has been mooted at this stage due to various constraints including those described above and also the area's natural heritage value (see section 6.3).

Given the above, it is clear that there is no current strategy to bring about any 'step-change' increase in population in the south cluster area. Despite this, City Plan 3 is currently being developed and the ongoing development of the CG Strategy and Framework should have regard to any emerging policy on housing and population of relevance to the south cluster area. This may prove to be a key issue when integrating Games legacy projects and actions with any emerging land use strategy under City Plan 3 e.g. consideration of options for further greenfield release in the Castlemilk/ Carmunnock area.

6.2.2 Health and the environmental determinants of health

This section outlines some of the key health issues in Glasgow south east and south west and, where relevant, summarises specific interrelationships between human health and the state of the environment in the area. There is a broad range of information available on health issues e.g. Local Community Planning Partnership (CPP) Residents' Surveys and the Glasgow Centre for Population Health's (GCPH) Community Health and Wellbeing Profile for the area. Where appropriate, information here has been documented at the level of individual communities.

Community perceptions of environmental quality and environmental services

Two recent reports prepared on behalf of Glasgow Community Planning Partnership document the outcomes of residents' surveys undertaken for the Govan and Craigton and Linn and Langside Local Community Planning Partnership (CPP) areas. These two Local CPP areas encompass the key south cluster communities listed in Table 6.1 as shown on Figures 6.1 and 6.2. Residents involved in the survey were asked to comment on a range of issues in relation to 'cleansing and the environment' and 'quality of

your neighbourhood'. Tables 6.2 to 6.5 summarise some of the key findings from these studies for the Local CPP areas 'as wholes'.

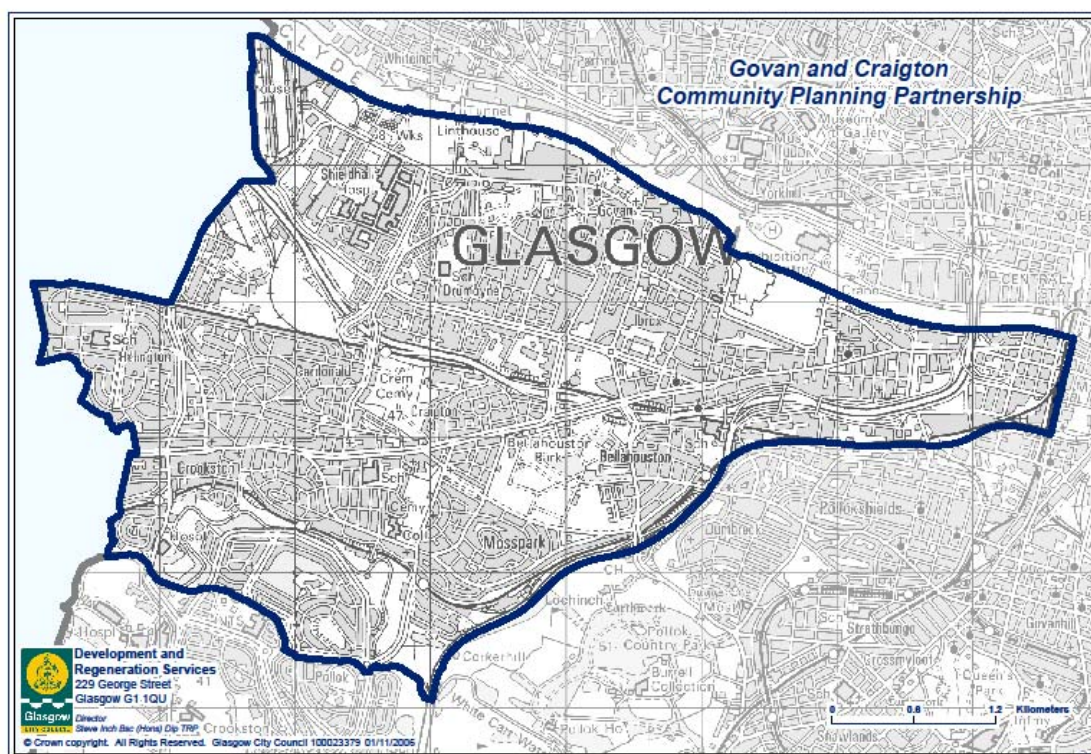


Figure 6.1 Govan and Craigton Local CPP area

Table 6.2 Summary findings from the Govan/ Craigton Local CPP 'Cleansing and Environment' survey

(Source: ODS Consulting, 2008)

Criteria	Summary statistics (note: emphasis added)			
	Serious problem	Problem	Not much of a problem	Not a problem at all
Litter in the streets	5%	23%	15%	51%
Untidy gardens	1%	12%	17%	65%
Untidy communal areas	1%	7%	10%	63%
Dirty stairs and closes	1%	2%	5%	58%
Graffiti	2%	11%	11%	69%
Fly tipping and dumping	2%	10%	8%	73%

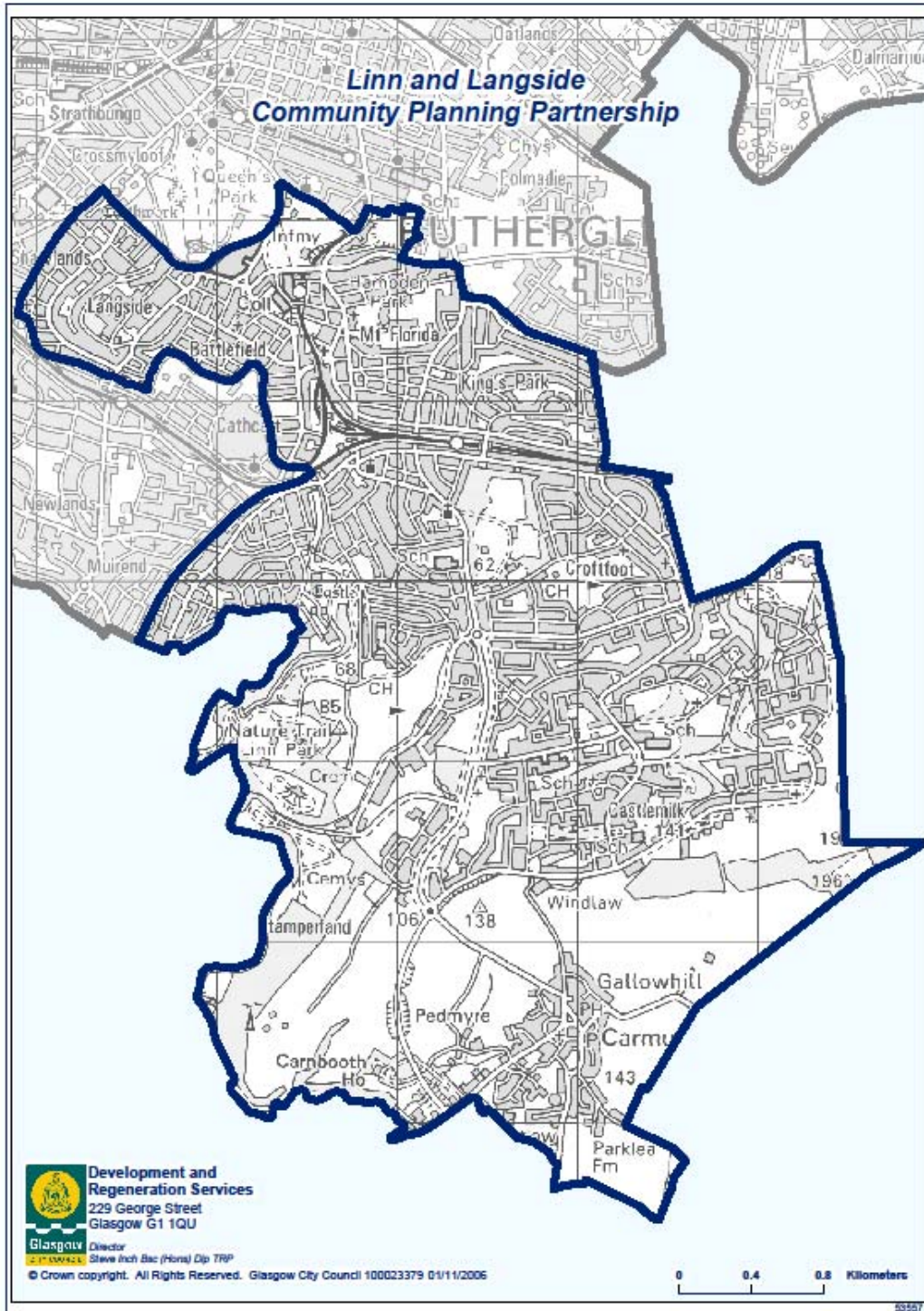


Figure 6.2 Linn and Langside Local CPP area

Table 6.3 Summary findings from the Linn/ Langside Local CPP ‘Cleansing and Environment’ survey

(Source: ODS Consulting, 2008)

Criteria	Summary statistics (note: emphasis added)			
	Serious problem	Problem	Not much of a problem	Not a problem at all
Litter in the streets	2%	21%	23%	48%
Untidy gardens	1%	10%	25%	59%
Untidy communal areas	0%	8%	20%	54%
Dirty stairs and closes	0%	1%	12%	39%
Graffiti	1%	10%	22%	57%
Fly tipping and dumping	3%	11%	21%	57%

As highlighted in Tables 6.2 and 6.3, south cluster residents have a number of concerns in relation to ‘cleansing and environment’ issues within their communities. In both Local CPP areas, these concerns are primarily related to litter, untidy gardens, graffiti and fly tipping and dumping. Litter is perceived to be the most important issue by a substantial margin. The south cluster is the only one of the three clusters where residents perceive fly tipping and dumping to a significant concern. Litter in the streets, graffiti and fly tipping and dumping are perceived as particularly significant issues in Castlemilk where, respectfully, 31%, 23% and 26% of residents consider these issues to be a ‘problem’.

Table 6.4 Summary findings from the Govan/ Craigton Local CPP ‘Quality of your neighbourhood’ survey

(Source: ODS Consulting, 2008)

Criteria	Summary statistics (note: emphasis added)			
	Very poor	Poor	Good	Very good
Attractive buildings	4%	7%	55%	19%
Attractive environment	3%	6%	57%	19%
Quiet and peaceful environment	4%	8%	56%	21%
Parks/ open spaces	3%	8%	52%	13%
Children’s play areas	9%	17%	34%	7%
Overall quality	2%	3%	59%	21%

Table 6.5 Summary findings from the Linn/ Langside Local CPP 'Quality of your neighbourhood survey

(Source: ODS Consulting, 2008)

Criteria	Summary statistics (note: emphasis added)			
	Very poor	Poor	Good	Very good
Attractive buildings	5%	6%	57%	15%
Attractive environment	5%	6%	57%	17%
Quiet and peaceful environment	6%	10%	48%	19%
Parks/ open spaces	8%	14%	49%	12%
Children's play areas	12%	17%	31%	7%
Overall quality	5%	5%	50%	22%

As highlighted in Table 6.4, the primary 'quality of your neighbourhood' issue of concern in the Govan and Craigton Local CPP area is the provision of children's play areas. Crucially, over and above the 17% of residents who consider this provision to be 'poor', an additional 9% consider it to be 'very poor'. This concern is much more pronounced in the Greater Govan neighbourhood area where 31% of residents consider this provision to be 'poor' and a further 13% 'very poor'.

In marked contrast to the relatively few issues raised by Govan and Craigton residents, those living in the Linn and Langside area expressed many more concerns. As highlighted in Table 6.5, residents in this Local CPP area have significant concerns in relation to the provision of a quiet and peaceful environment, parks/ open spaces and children's play areas. These concerns were particularly pronounced in the Castlemilk neighbourhood area where residents have raised the following concerns:

- **Attractive buildings:** 10% very poor and 17% poor;
- **Attractive environment:** 9% very poor and 22% poor;
- **Quiet and peaceful environment:** 10% very poor and 24% poor;
- **Parks/ open spaces:** 14% very poor and 40% poor; and
- **Children's play areas:** 22% very poor and 39% poor.

Whilst all these concerns are arguably significant, key headline concerns are around the provision of parks and open spaces, children's play areas and, more generally, that of a 'quiet and peaceful' environment. These concerns (which are by far the worst raised in any of the cluster areas) are particularly worrying given that the non-statutory Castlemilk Local Development Strategy, dated 2003, highlights that *'70% of the area's physical regeneration is now complete'* (Glasgow City Council, 2003). Furthermore, the concerns raised here highlight some of the stark inequalities in relation to health and environmental justice issues still experienced by many of Glasgow's communities – residents of the adjacent Carmunnock neighbourhood area do not report any significant concerns in relation to 'quality of your neighbourhood' criteria. Given the links between the environment and health discussed elsewhere in this report (and in addition to other health determinants such as employment), it is perhaps unsurprising that men and women residing in the Carmunnock area can expect to live longer than the Scottish average whereas those in Castlemilk are likely to live less long. The sheer proximity of these two neighbourhoods (including the sharing of key outdoor

recreational resources such as Cathkin Braes Country Park etc) highlights the importance of tackling these inequality issues.

Health issues and potential relationships with perceived and actual environmental quality

Table 6.6 highlights Glasgow south-east and south-west statistics for several key health outcome indicators that may be influenced by environmental factors. The statistics indicate that the health of residents within the broad south cluster area is worse than that of the average Scot. This is particularly true in relation to deaths as a result of coronary heart disease. Despite this, life expectancy for both males and females is only slightly lower than the Scottish average. As described elsewhere in this report, local environmental quality can play a key role in people's health. Given this, a key issue for the SEA to address has been the identification of opportunities whereby the ongoing development of the CG Strategy and Framework can work towards improving relevant environmental conditions, thus contributing to improved health. The remainder of this section highlights some of the key relationships between the health of south cluster residents and key environmental determinants of health that the CG Strategy and Framework may influence.

Table 6.6 Glasgow south, key health outcome indicators that may be influenced by environmental factors

(Source: GCPH, 2008)

Indicator	South Glasgow			
	South-west data	Position relative to Scottish average	South-east data	Position relative to Scottish average
Population and demographics				
Male life expectancy	70.1 years	Lower (5 years)	71.4 years	Lower (3 years)
Female life expectancy	76.7 years	Lower (3 years)	78.0 years	Lower (1 year)
Single adult households	39.9%	Lower (7%)	44.0%	Higher (3%)
Mortality				
Deaths all ages ¹⁶	7,935	Higher (30%)	5,482	Higher (16%)
Coronary heart disease deaths in under 75s	669	Higher (46%)	482	Higher (39%)
Cerebrovascular disease deaths in under 75s	198	Higher (31%)	126	Higher (12%)
Mental health and function				
Self assessed health classified as 'not good'	15.6%	Higher (54%)	13.6%	Higher (34%)
Patients prescribed drugs for anxiety/ depression	9.6%	Higher (19%)	8.9%	Higher (10%)
Housing and transport				
Overcrowding ¹⁷	19.3%	Higher (65%)	21.7%	Higher (85%)
Travelling to work by foot, bike or public transport	55.6%	Higher (25%)	56.9%	Higher (28%)

The provision of and easy access to good quality greenspace and/ or other recreational space can encourage the increased uptake of outdoor recreation. This in turn can contribute to improved health as outlined in further detail in section 5.2.2. As shown on Figures 6.3 and 6.4, south cluster residents enjoy access to a range of different types of greenspace including formal parks and gardens, amenity greenspace and natural/ semi-natural greenspace. Despite these strengths, each of the neighbourhood areas within the

¹⁶ All mortality statistics have been calculated as annual averages over a five year period

¹⁷ Percentage of all households considered to be overcrowded – relates the actual number of rooms in a household to the number of rooms 'required' by the members of the household (based on the relationships between them and their ages)

south cluster experience some issues/ constraints in relation to greenspace provision with particularly pertinent problems in the Castlemilk area (see above). A fairly widespread issue that Figures 6.3 and 6.4 highlight quite clearly is the poor provision of children's play areas (as discussed further above). The following is a brief summary of the greenspace challenges/ opportunities in some key south cluster neighbourhood areas:

- **Ibrox/ Kingston:** aside from Festival Park, this area is relatively poorly served with public greenspace. Anecdotally, there is some evidence of anti social behaviour at Festival Park which may be an important deterrent to its wider public use. As shown on Figure 6.4, the majority of greenspace in this area is classified as *private gardens/ grounds* which, by its very nature, has limited accessibility to the general public. Despite this, the key greenspace resource of Bellahouston Park lies within walking distance to the south-west. One key barrier to accessing this park however is the M8 motorway which has limited crossing points in this area;
- **Kings Park/ Mount Florida and Toryglen:** similarly, these two adjacent neighbourhood areas are relatively poorly served with public greenspace. There is a large *amenity greenspace* site in Toryglen although this is currently reported as having quite limited amenity value;
- **Castlemilk:** as outlined in section 6.2.2 above, a substantial portion of Castlemilk residents consider neighbourhood quality in their area to be 'poor' and 'very poor' across several key criteria including parks and open spaces and children's play areas. This is born out, to a degree at least, following a review of Figure 6.3 which highlights that the majority of greenspace in the Castlemilk area is designated as either *green corridor* or *natural/ semi-natural greenspace*. Whilst these sites are not the kind best suited resource to outdoor leisure and recreation, their prevalence within the Castlemilk area raises a key opportunity that the ongoing development of the CG Strategy and Framework may consider (e.g. development of the of healthy walks initiative within the area, core paths/ safer routes to school, environmental education etc).

Based on the issues highlighted above and the health indicator information in Table 6.6, it is arguable that the provision of adequate public greenspace may be a key environmental determinant of health in the south cluster area. Similarly to the issues faced in the east cluster area (see section 5.2.2), there are arguably two key barriers to outdoor recreation in the south cluster area.

- There is a key issue in relation to poor provision of public amenity greenspace in some areas. Communities with poor access to greenspace may be less likely to travel outwith their immediate neighbourhood area to access greenspace for recreational purposes. This is of particular relevance to the Ibrox/ Kingston, Kings Park/ Mount Florida and Toryglen neighbourhoods. One solution may be to develop and/ or enhance existing signage for 'key routes' that access greenspace. This could be tied into with Core Paths enhancement e.g. development of 'aspirational' core paths; and
- Some neighbourhood areas are well served by existing greenspace although the majority of sites are designated as 'green corridor' or 'natural/ semi-natural' greenspace. Whilst these sites represent a good biodiversity resource, they are of limited use in terms of outdoor leisure and recreation. Despite this, a key opportunity exists to enhance these sites to support a range of objectives including biodiversity protection and enhancement as well as human health, outdoor leisure/ recreation and environmental education.

As depicted on Figure 5.4, air quality is not a major issue in the south cluster area although there are some issues around Ibrox/ Craigton and Greater Govan. In any event, the ongoing development of the CG Strategy and Framework should ensure that air quality is protected in the south cluster area to avoid the aggravation/ generation of air quality related health issues.

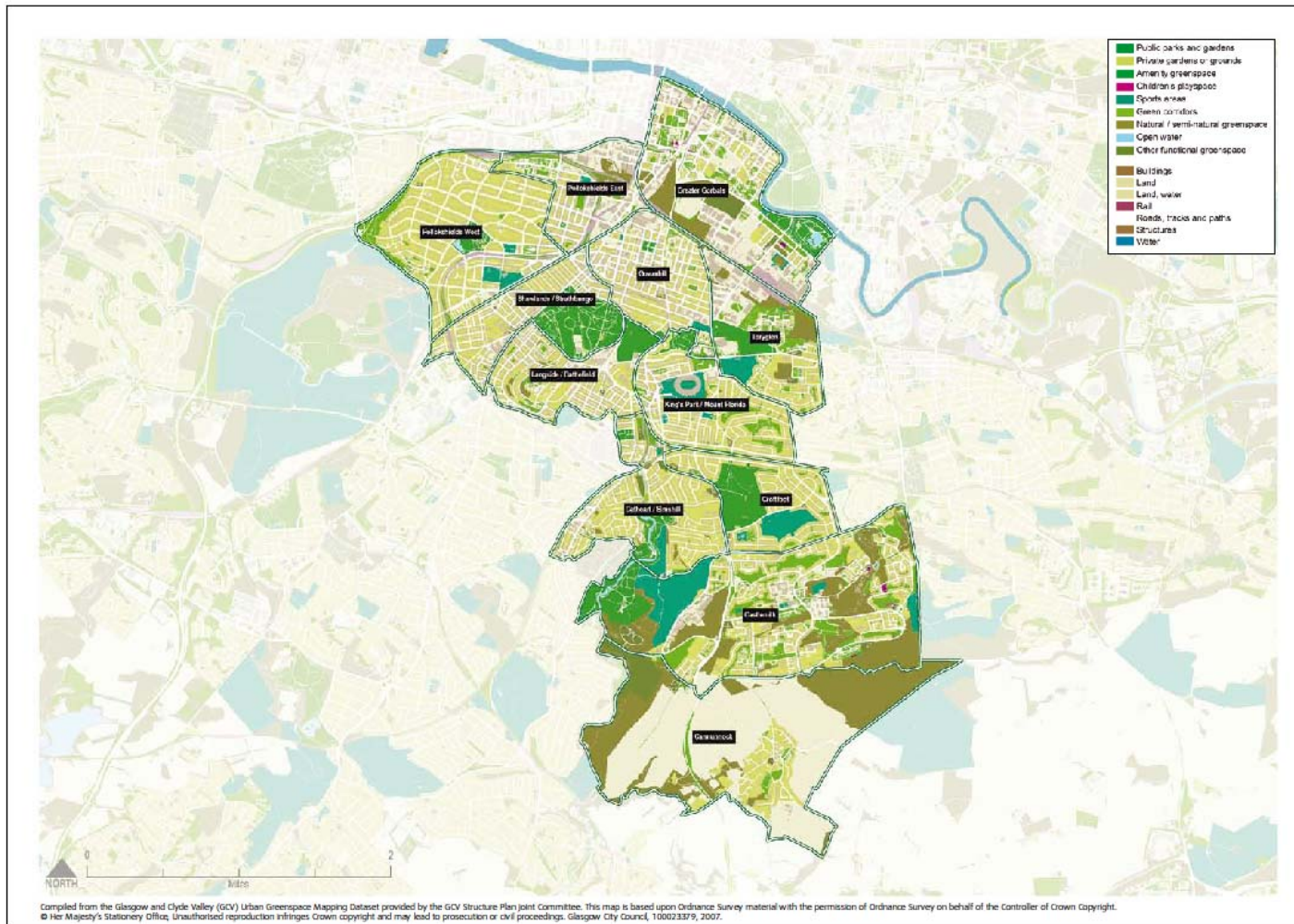


Figure 6.3 South east Glasgow greenspace provision

(Source: GCPH, 2008)

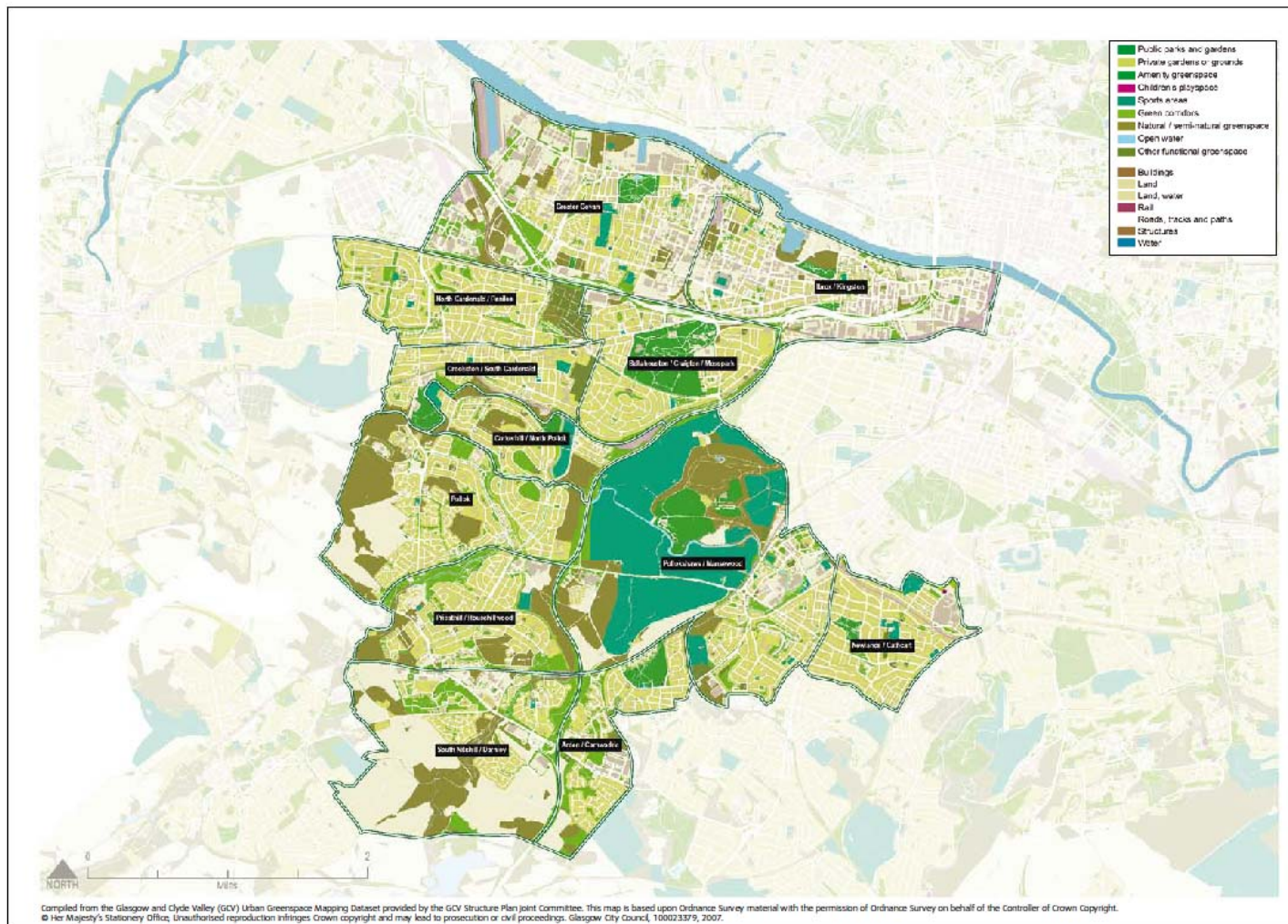


Figure 6.4 South east Glasgow greenspace provision

(Source: GCPH, 2008)

6.2.3 Access

The provision of safe and sustainable access options (i.e. core paths, cycle routes etc) within the south cluster area reflects that of the various other environmental determinants of health outlined above – some areas are relatively well served whilst others are not. In any event, there is arguably a key challenge to be overcome in the area in relation to encouraging local people to adopt healthier more sustainable lifestyles that take advantage of the area's existing access, greenspace and other outdoor recreational resources. 'Access' in this context is largely concerned with the provision of safe and sustainable routes that local communities can use to access outdoor recreational facilities (such as parks and gardens and other amenity greenspace) and/ or routes that can be used for exercise in their own right (see section 5.2.3 for further information). The remainder of this section outlines some of the key access issues and opportunities in the south cluster area:

- **Ibrox/ Kingston:** this area shares similar access provision to that described for much of the west cluster area (see section 4.2.3). The proximity of the Clyde is a clear linear feature along which there is an existing core path. There are two stretches of 'aspirational core path' along this route in Govan and at Prince's Dock (where a new bridge would be required to link the route). Other 'east-west' access provision in the area is the Paisley Road West cycle route. Similarly to the west cluster area however, there are few cross-community routes that link population centres with the main 'east-west' routes on the Clyde/ Paisley Road West;
- **Kings Park/ Mount Florida and Toryglen:** the Kings Park and Toryglen neighbourhood areas are relatively well served with core paths. There is an existing network in the area that provides good access from several parts of Toryglen and Kings Park. Several of these routes also provide access to the Kings Park from nearby cycle routes. There are no aspirational core paths in the area; and
- **Castlemilk and Carmunnock:** this area is well served with core paths that provide a range of access options from the population centres of Castlemilk and Carmunnock to Cathkin Braes Country Park. Whilst core path provision within the Cathkin Braes site itself is good, there may be scope to capitalise on Castlemilk's semi-rural nature and expand the range of core paths within the town itself thus taking advantage of the many underused greenspace sites.

6.3 Wildlife conservation & ecosystem services

As shown in Appendix H, the south cluster area is home to a substantial portion of Glasgow's biodiversity and natural heritage resource. Of key importance is the Cathkin Braes site which comprises one of Glasgow's seven Local Nature Reserves (LNRs) as well as Cathkin Braes Country Park Site of Special Landscape Importance (SSLI) and two sites designated as ancient, long-established or semi-natural woodland ('Big Wood' and 'Glen Wood').

6.3.1 Statutory and non-statutory conservation designations

Section 4.3.1 outlines the various national and local level provisions for the protection of sites that are important for nature conservation. The south cluster area is of key importance in terms of its natural heritage value and is certainly the richest of the three cluster areas in this regard. The area's natural heritage resource is focused primarily around the Cathkin Braes site (which has multiple designations) although there are several other important sites in the area including SSLIs and city-wide and locally important SINC. Many of these sites are also home to LBAP species or feature a range of key LBAP habitats. Key LBAP habitats and species found in the south cluster area are discussed further in section 6.3.2.

Whilst parts of the south cluster area are clearly very rich in terms of their biodiversity and natural heritage resource, these sites are arguably underused as an outdoor recreation and exercise and/ or environmental education resource. As discussed in section 6.2, south cluster residents experience a range of health problems and have raised concerns about the quality of their local neighbourhoods on issues relating to the provision of parks/ open space, children's play areas and a 'quiet and peaceful environment'. In addition, section 6.2.3 summarises access provision in the area, particularly in relation to sustainable walking/ cycling options using the area's core paths. An analysis of this information highlights that much of the outdoor recreation 'infrastructure' is in place, particularly around the Castlemilk area where significant health and greenspace access problems have been noted. A key issue for the ongoing development of the CG Strategy and Framework to consider is the identification of opportunities for promoting/ supporting the development and enhancement of multi functional greenspaces and/ or the removal of barriers (both physical and psychological) to the access of existing greenspace. There is arguably a clear synergy in the Castlemilk/ Cathkin Braes area between the promotion of healthy lifestyles, outdoor recreation and exercise and biodiversity protection and enhancement.

Table 6.7 South cluster conservation designations

Site	Area and distance from key Games venue(s)	Additional information
C-SINCs and L-SINCs		
Cathkin Braes and Big Wood (C-SINC)	The Cathkin Braes Mountain Bike Venue occupies this site. The site encompasses 101.48 Ha Note: Cathkin Braes is a proposed Local Nature Reserve	<ul style="list-style-type: none"> • This site contains the best area of unimproved, species rich grassland in the city. These extensive, colourful grasslands provide a habitat for field voles which in turn become food for hunting kestrels and wintering short-eared owls • The Big Wood is an area of mature beech, sycamore, oak and other trees. In the spring and summer the woodland floor is carpeted with bluebells and the delicate flowers of pink purslane • Areas of heath, marsh and scrub add to the complexity and wildlife interest of the site
Windlaw Farm (C-SINC)	The Cathkin Braes Mountain Bike Venue occupies this site	N/A
Castlemilk Glen/ King's Burn (C-SINC)	This site is approximately 440m north of the Cathkin Braes Mountain Bike Venue	N/A
White Cart Water (C-SINC)	This site is approximately 740m west of the Cathkin Braes Mountain Bike Venue and 570m west of Hampden Park	N/A
Pedmyre (L-SINC)	This site is approximately 380m south-east of the Cathkin Braes Mountain Bike Venue	N/A
Malls Myre (L-SINC)	This site is approximately 500m to the east of Hampden and encompasses 7Ha	N/A
SSLI		

Site	Area and distance from key Games venue(s)	Additional information
Cathkin Braes Country Park	The Cathkin Braes Mountain Bike Venue occupies this site. The site encompasses 199 Ha	<ul style="list-style-type: none"> • Cathkin Braes Country Park covers a large area in the south east of Glasgow. As the highest point in Glasgow it is a familiar landmark on the southern skyline • The park is renowned for panoramic views over the city and beyond including the Gleniffer Braes and the Kilpatrick and Campsie ranges • The natural environment of the park features abundant informal paths, ancient woodland, grassland, heath and scrub
Toryglen Park	This site is adjacent to the north of the Toryglen Football Centre	N/A
Prospect Hill	This site is approximately 350m to the east of the Toryglen Football Centre	N/A
Ardmay Park	This site is approximately 230m to the south of the Toryglen Football Centre	N/A
Bellahouston Park	Occupying 71Ha this site is approximately 500m south of Ibrox Stadium	This extensive park has many features and facilities including formal gardens and open parkland. There are also extensive sports facilities
Ancient, long-established and semi-natural woodland		
Big Wood	Occupying 31Ha, this site lies adjacent to the north of the Cathkin Braes Mountain Bike Venue	N/A
Glen Wood	Occupying 25.2Ha, this site is approximately 410m to the north of the Cathkin Braes Mountain Bike Venue	N/A

6.3.2 LBAP Habitats and Species

As is evident from Table 6.7, the south cluster area is home to a wealth of biodiversity and natural heritage interest, particularly around the proposed LNR site at Cathkin Braes. Unsurprisingly, several of the Glasgow LBAP's key species and habitats can be found in the south cluster area. Again, this is particularly noticeable around the Cathkin Braes site. Table 6.8 outlines some of the key pressures and threats affecting Glasgow LBAP habitats and species found in the south cluster area. In addition, this table highlights key environmental protection objectives and actions from the plan that the ongoing development of the CG Strategy and Framework should have regard for. Where relevant, these actions and objectives have been incorporated with the development of the SEA Framework to ensure that the SEA assessment of the CG Strategy and Framework captures consideration of key environmental issues and effects of relevance to biodiversity protection and enhancement in Glasgow (see Chapter 8).

Table 6.8 Pressures and threats affecting key Glasgow LBAP habitats and species

(Source: Glasgow LBAP, 2008)

Key pressures and threats	Relevant actions and environmental protection objectives
Local Habitat Action Plans (HAPs)	
Broadleaved and mixed woodland	
<ul style="list-style-type: none"> Glasgow's broadleaved and mixed woodland areas make an important contribution to the landscape and amenity of the City. In general, the more natural woodlands in Glasgow have survived on steeper ground where development has proved to be too costly or difficult. The key site in the south cluster area is Cathkin Braes and Big Wood Glasgow's woodlands are also crucial to the objectives of other HAPs and SAPs and wider Council policy such as that on green network, air quality and climate change. They can be important components of habitat mosaics at a number of sites, including urban ones, and are often very important elements along water course corridors. They also help provide the necessary conditions for a number of key, declining species to stabilise and/ or increase their population, both within and outwith the city <p>Key factors influencing the loss or decline of woodland in Glasgow include:</p> <ul style="list-style-type: none"> Lack of woodland management leading to loss, invasion or dereliction Fragmentation of woodland resources leading to a less robust ecosystem Land use pressures such as transport, housing, industrial and business developments Replacement of native stands by non-native trees Invasion by non-native species such as Rhododendron, Sycamore and Beech People pressure e.g. recreational use, vandalism Air pollution and acid deposition 	<p>Key objectives:</p> <ul style="list-style-type: none"> To maintain the current extent of ancient semi-natural woodland Identify and assess woodland areas of important nature conservation value To increase the total extent of priority woodland habitat within the City To ensure the ecological value of broadleaved and mixed woodland is improved To promote woodlands for socio-economic and public amenity benefits <p>Key actions:</p> <ul style="list-style-type: none"> Work with private and public landowners to further maintain and enhance riparian woodlands and those associated with water Identify owners and promote long term management plans at all key sites, aimed at increasing the nature conservation interest of woodland and recognising interaction with related habitats Encourage woodland expansion by natural colonisation and planting of site-native and local genetic provenance Promote training on the conservation and management of broadleaved and mixed woodland to relevant landowners and managers Support community woodland groups Use appropriate woodlands as a resource for environmental education with schools and community groups Increase understanding of woodlands through development of effective integration with education authorities e.g. Forest Education Initiative and In-service programmes for teachers
Neutral grassland	
<p>Occur on circumneutral soils that are neither strongly acid nor very alkaline. They can be further defined as being improved, semi-improved or unimproved depending on the degree of agricultural intensification. Unimproved grasslands are managed through grazing and hay cutting, often in combination, and are characterised by supporting a rich diversity of grasses and herbs, and a rich associated fauna. The</p>	<p>Key objectives:</p> <ul style="list-style-type: none"> Ensure no further loss or depreciation in main areas or identified key sites supporting neutral grassland Maintain and restore favourable management regimes at key sites Encourage awareness and appreciation of neutral grasslands

Key pressures and threats	Relevant actions and environmental protection objectives
<p>key neutral grassland site in the south cluster area is Cathkin Braes</p> <p>Key factors influencing the loss or decline of neutral grassland in Glasgow include:</p> <ul style="list-style-type: none"> • Agricultural intensification such as ploughing, re-seeding, draining, heavy fertiliser treatment, slurry application, over-grazing, conversion to arable and a shift from hay-making to silage production • On the urban fringe threats are from development pressures and unsympathetic amenity grassland management cutting regimes. Despite this issue, neglect or abandonment can be equally detrimental leading to rank growth and scrub encroachment 	<p>Key actions:</p> <ul style="list-style-type: none"> • Ensure the importance of neutral grasslands, and their management, is recognised in Local Plans and Policy Guidelines • Oppose, or propose alternatives to, development applications for land use, which will damage or destroy areas of neutral grassland • Encourage sympathetic management of existing areas and habitat creation at public land • Involve schools, and community groups in neutral grassland conservation and creation projects
Acid grassland	
<ul style="list-style-type: none"> • Acidic grasslands (and associated vegetation mosaics such as heaths and rush pastures), provide important breeding grounds for a number of waders, and also support populations of small mammals and birds, which in turn provide a resource for raptors. Invertebrates can also be well represented at areas of unimproved grassland • In the Glasgow area most of the remaining acidic grasslands are associated with the upland fringe pastures, although where these occur on shallow basaltic or other rocky outcrop soils, such as the Cathkin Braes, their biological diversity can be high. The key acid grassland site in the south cluster area is Cathkin Braes • Unimproved or traditionally managed acid grasslands have declined in recent years. Large areas have been improved by agricultural treatments or conversion to ley pastures. However a number have also been lost to urban developments and, particularly to the urban fringe and management for golf courses <p>Key factors causing loss or decline of acid grassland in Glasgow include:</p> <ul style="list-style-type: none"> • Agricultural intensification: particularly fertilisation, ploughing or drainage • Woodland planting: schemes often target the lower productivity, unimproved grasslands • Neglect: encouraging the spread of scrub, notably birch or gorse, and bracken • Built developments: causing direct loss of sites, both to urban fringe and local central sites such as old sand quarries and waste ground 	<p>Key objectives:</p> <ul style="list-style-type: none"> • Ensure no loss in area or reduction of quality of the current, main acid grassland sites • Increase the current area of acidic grassland through restoration and positive management • Promote awareness and value of acidic grassland to landowners, managers and general public <p>Key actions:</p> <ul style="list-style-type: none"> • Ensure important acid grassland sites are noted in Local Plans, district and regional Structural Plans and land-use Strategy documents • Ensure the value and needs of existing grasslands are noted during woodland planting schemes • Oppose, or minimise impacts of, land use developments, forestry and agricultural activities that will adversely affect acid grasslands • Encourage landowners, managers and farmers to implement sympathetic management • Develop conservation management plans or agreements at key acid grassland sites • Encourage public access and appreciation of acidic grasslands, where appropriate

Key pressures and threats	Relevant actions and environmental protection objectives
<ul style="list-style-type: none"> Unsympathetic management: intensive treatment of grasslands in parks and golf courses reduces potential sward diversity 	
Local Species Action Plans (SAPs)	
Burnet-saxifrage	
<ul style="list-style-type: none"> Burnet-saxifrage is known at a small number of sites in the south of the City, occurring as a number of small, scattered individuals or populations. The localities are all associated with unimproved grasslands on the Cathkin Braes, but include golf course margins at nearby Blairbeth Key factors causing loss or decline of Burnet-saxifrage in Glasgow are centred around the general decline in unimproved pasture. Agricultural improvement is the most likely cause of loss, although high stock densities may lead to over-grazing damage 	<p>Key objectives</p> <ul style="list-style-type: none"> Maintain the current distribution and population sizes Introduce appropriate habitat management to encourage viable populations Increase the distribution of Burnet-saxifrage at suitable habitats <p>Key actions:</p> <ul style="list-style-type: none"> Ensure the value and needs of existing pasture sites are noted during woodland planting schemes Ensure protection of known sites in any developments subject to Planning Applications Encourage landowners, managers and farmers to implement sympathetic management at suitable sites Establish nursery sites for species propagation Promote Burnet-saxifrage as indicator of species rich grassland to landowners and public
<p>Additional note on Local Species Actions Plans:</p> <p>The south cluster area and the Cathkin Braes site in particular is home to a good deal of the species for which Local Species Actions Plans (SAPs) have been prepared. These include the Small Pearl-bordered Fritillary butterfly, Common Frog, Skylark, Reed Bunting, Tree Sparrow and Badgers. Where possible, the SEA of the CG Strategy and Framework has adopted an ecosystems based approach whereby the potential adverse and beneficial effects on habitat heterogeneity and species connectivity have been identified and mitigated/ enhanced where appropriate. In line with the approach taken by other studies (such as the GCV Integrated Habitat Network Model), the approach adopted in the SEA has been to focus on consideration of habitat and how the distribution and size of key habitats can contribute to more widespread ecosystem health and resilience. The premise is that through the protection and, where relevant/ possible, enhancement of key habitats, individual species such as those outlined above will also be protected and enhanced. Note: the broad-brush assessment in this SEA should inform more detailed assessments in lower level SEA, EIA and planning decisions.</p>	

6.4 Water bodies & flooding

6.4.1 Local plans, policies and strategies

The improvement in water quality across Scotland can be attributed mainly to the *Water Framework Directive (WFD)* and the subsequent *Scotland River Basin Management Plan* that was developed by SEPA in response to the requirements of the WFD. At a local level the City Plan 2 has a number of environmental policies that are concerned primarily with the water environment and flood risk. These are outlined below:

- **City Plan 2 Policy ENV17:** Protecting the water environment: to ensure new development does not have an adverse impact on the water environment by preventing the deterioration of aquatic ecosystems and enhancing their quality, including groundwater, promoting sustainable water use, reducing pollution and mitigating against the impact of severe weather events;
- **City Plan 2 Policy ENV4:** Sustainable drainage systems (SuDS): To ensure satisfactory sustainable measures are provided for the management and safe disposal of surface water run-off; and
- **City Plan 2 Policy ENV5:** Flood prevention and land drainage: to safeguard development from the risk of flooding and to ensure new development does not have an adverse impact on the water environment, does not materially increase the probability of flooding elsewhere and does not interfere detrimentally with the storage capacity of any functional flood plan or associated water flows.

6.4.2 Water quality

White Cart Water (Kittloch Water to Hamills Weir)

The White Cart Water runs through the middle of the South Side Cluster, passing through Pollok Country Park, Langside, and Cathcart then through Stamperland before skirting round the south of Carmunnock and Cathkin Braes. SEPA have classified this water body as having an overall status of Poor Ecological Potential with Medium Confidence in 2008 with overall ecological status of Poor and overall chemical status of Fail.

Environmental objectives have been set by SEPA for this water body over future river basin planning cycles in order that sustainable improvements to its status can be made over time, or alternatively that no deterioration in status occurs, unless caused by a new activity providing significant specified benefits to society or the wider environment. For this water body SEPA have set the overall environmental objectives for the first, second and third River Basin Management Planning cycles as:

- 2008: Poor;
- 2015: Moderate;
- 2021: Moderate; and
- 2027: Good.

6.4.3 Flood risk

Within the area broadly encompassed by the south cluster, the potential for floods is not as great as in the West and East; however the White Cart Water has flooded heavily in the past. Works are currently ongoing on a flood defence scheme for the river which will result in future flood risk being diminished. A study of current SEPA flood mapping has shown that a 1 in 200 year event could extend to within 300 metres of the south east of Hampden Park, however as stated above, this risk would likely be removed upon the completion of the flood defences.

6.5 Air quality, noise & dust

Unlike the west and east cluster areas and indeed the city centre, the south cluster area does not contain an Air Quality Management Area (AQMA). Despite this fact, air pollution and quality issues remain a concern throughout the Glasgow area due to road traffic and other transportation pressures. Given this, a key issue for the SEA to address is the consideration of potential air quality issues and effects with a view to ensuring that the CG Strategy and Framework does not contribute to any worsening of the existing air quality situation.

6.5.1 Air quality

Outwith the existing AQMAs, NO₂ monitoring data from elsewhere in the city indicates that there are potentially a number of other emerging NO₂ related air quality issues. This is also true of the south cluster area. GCC's 2009 Air Quality Updating and Screening Report identifies the area around Bridge St/ Norfolk St (where the annual mean for NO₂ has been consistently higher than the AQS objective between 2006 and 2008) as a key risk area given the presence of vulnerable receptors around the junction. For the purposes of the Commonwealth Games SEA (and in recognition of their potential use as games-time routes) two additional monitoring locations have been highlighted for consideration (see Table 6.9). Although there are arguably a number of potentially NO₂ vulnerable locations within Glasgow, the majority of monitoring locations outwith the three AQMAs exhibit compliance with the annual mean objective for NO₂.

Table 6.9 NO₂ vulnerable locations in the south cluster area

Note: exceedences are highlighted in bold red
(Source: Glasgow City Council, 2009)

NO ₂ monitoring locations outwith existing AQMAs	NO ₂ µg m ⁻³ (2005 objective level: 40 µg m ⁻³ annual mean)			
	2006	2007	2008	Trend
Bridge Street/ Norfolk Street	54	49	50	Decrease
Paisley Road West	33	36	37	Increase
Haggs Road	32	35	36	Increase

6.5.2 Noise

The south cluster area contains several candidate Noise Management Areas (NMA) designated for road traffic environmental noise and several candidate Quiet Areas (QA) as outlined below. Please refer to Appendix G section 5.4 for further information on consideration of noise in the SEA of the CG Strategy and Framework. Please refer to Appendices H and I for maps showing the locations of the candidate NMAs and QAs.

Candidate Noise Management Areas designated for road traffic related environmental noise

- **Site:** M8 (Jura Street area), **Location:** Craigton;
- **Site:** M8 (Junction 24/ Helen Street area), **Location:** Bellahouston;
- **Site:** M8 (Kirkwood Street area), **Location:** Ibrox;
- **Site:** M8 (Clifford Street area), **Location:** Ibrox;
- **Site:** M8 (Scotland Street West), **Location:** Kinning Park;
- **Site:** Paisley Road (Seaward Street), **Location:** Kinning Park/ Tradeston; and
- **Site:** Paisley Road (Morrison Street), **Location:** Tradeston/ Kingston Bridge (**note:** there are two candidate NMAs at this site).

Candidate Quiet Areas:

- King's Park;
- Glen Wood;
- Big Wood (**note:** there are two candidate QAs at this site); and
- Cathkin Braes Park.

6.6 Soil

Concentrations of known and suspected contaminated land are found around Ibrox, Hampden Park and Toryglen. Within Cathkin Braes there is one suspected contaminated land site located within the extent of the mountain biking venue, this being related to a former quarry. At Ibrox known and suspected contaminated land surrounds the stadium; these are related to previous industrial activities including foundry works, engineering works, factories, textile works and fuel stores. At Hampden Park there are known and suspected contaminated sites associated with activities similar to those at Ibrox, as well as with extensive colliery workings that used to occupy land at Curtis Avenue and King's Park close to the Toryglen football complex.

6.7 Climate change issues

6.7.1 Flood risk provisions

Flood defences are currently being constructed along the White Cart Water.

6.7.2 Renewable energy provisions – potential areas for development

Cathkin Braes is to be the site of the Castlemilk and Carmunnock Community Wind Park, which will be the UK's first council run wind farm. As with the other Games venues there could be the potential to investigate the feasibility to include micro-renewable generators within venues, as well solar panels etc on lighting and signage.

6.7.3 Green Spaces

Within the South Side there are a large number of open spaces, particularly Pollok Park, Queen's Park, Bellahouston Park, Cathkin Braes Country Park, as well as smaller community parks and open spaces and allotments. The Sustainable Glasgow Initiative has also identified that within Glasgow, including the South Side, there is the potential for schemes such as urban woodland and new green spaces to be introduced.

6.8 Landscape & the historic environment

Games activity within the South Side cluster will be concentrated around the main venue areas: Ibrox, Hampden Park, Toryglen and Cathkin Braes. Given the location of each venue across a large swathe of the South Side, this section will concentrate on the venues and their immediate environs in order to develop an understanding of their character and identify any potential benefits and constraints that might be present. This follows below.

For each venue a buffer of 500 metres has been developed in order to identify those elements of the surviving historic townscape and landscape that could be affected by Commonwealth Games-related works. Further details of designated cultural heritage assets are given in Appendix H.

6.8.1 Local plans, policies and strategies

Within the South Side cluster there are 11 Conservation Areas, all of which have been subject to varying degrees of Conservation Area Appraisal. Given that the venues within the cluster are dispersed not all of these Conservation Areas will be relevant to the assessment, therefore we have identified those areas that are relevant below. Details and locations of all Conservation Areas are given in Appendix H.

- Dumbreck (located between Ibrox and Hampden);
- Strathbungo (located between Ibrox and Hampden);
- Crosshill (located between Ibrox and Hampden);
- Walmer Crescent (located between Ibrox and Cessnock Subway Station);
- West Pollokshields (located between Ibrox and Hampden); and
- East Pollokshields (located between Ibrox and Hampden).

These Conservation Areas lie within 500 metres of each venue and/ or are located in areas between venues and might therefore be potentially affected by any Games-related routes, public realm works, signage and associated infrastructure.

6.8.2 Ibrox

The area immediately surrounding Ibrox Stadium is a mixture of Victorian and early 20th century housing, both terraced and tenemented, wide open roads, concentrations of industrial units, the open space of Bellahouston Park to the south, and the iconic structure of the football stadium itself, part of which is a Category B Listed Building. There are two elements of the built historic environment that could be affected by pre-Games development, namely the Conservation Area of Walmer Crescent and Ibrox Stadium itself.

Walmer Crescent is located immediately adjacent to Cessnock Subway Station, and any developments here, such as public realm, station improvements and signage, would have to take this into account. Likewise, any pre-Games works on Ibrox Stadium would have to ensure that there is no damage of, alteration of, or removal of elements associated with the Listed Building. However, works that could enhance the appearance of the Listed Building could be deemed to be desirable.

6.8.3 Hampden Park and Toryglen

The area surrounding Hampden Park and Toryglen is very similar to the area surrounding Ibrox, in that it is a mixture of Victorian and 20th century residential and industrial development surrounding an iconic stadium structure. Games-related works within this area will be concentrated within Hampden Stadium itself, resulting in a temporary change of use from a football stadium to an athletics stadium. There will also be pre-Games works involving public realm development, and the introduction of temporary Games signage and associated elements.

A small section of the southern part of the Crosshil Conservation Area is located roughly 500metres to the north-west of Hampden Park, and there are a number of Category B and C(S) Listed Buildings within a 500metres radius of both venues, including B Listed buildings on Stanmore Road, Mount Florida Park Church, Mount Florida Primary School, Battlefield East Church and the C(S) Listed section of Hampden Crescent.

It is unlikely that Games-related development will have more than a temporary impact on the setting of some Listed Buildings close to Hampden Park during its refit. The character and appearance of some areas surrounding the venues could also be improved by the introduction of good quality public realm.

6.8.4 Cathkin Braes

Cathkin Braes is distinct from the other Games venues within Glasgow given its rural location on the southern outskirts of the City. There is therefore a much more distinct landscape character here, and a greater risk of adverse effects on not only the historic landscape, but potentially on buried archaeological remains.

There is evidence for human activity within Cathkin Braes from around the Iron Age, and artefacts and structural remains from this period have been recovered at various points within the Park. Both the Big Wood and Cathkin Braes Park Wood are thought to be of ancient origin, and have been identified as appearing on General Roy's Military Survey which was undertaken during the 1750s. A country park initiative was established in 1995 after a consultative process in the local area supported by the Strathclyde Plan and Carmunnock Local Plan.

The West of Scotland Archaeology Service has ten archaeological 'trigger zones' identified within a 500metre radius of the Cathkin Braes Country Park, these being areas where there is the potential for buried archaeological remains that could be associated with recorded prehistoric cairns and associated finds of buried artefacts. Any Games-related works in these areas could result in the requirement for archaeological investigations prior to works commencing. There is little by of the built historic environment within the venue, although the village of Carmunnock at the very western extent of Cathkin Braes is a Conservation Area. It is unlikely that pre-Games and Games-time developments would have any impact on this however.

7. ENVIRONMENTAL PROBLEMS AND OPPORTUNITIES IDENTIFIED

A requirement of the SEA Directive is to identify key environmental problems relevant to the plan being developed. Given the inherently broad scope of the CG Strategy and Framework, input from stakeholders at the key environmental issues workshop in May 2010 and evidence in this part of the Environmental Report (i.e. environmental baseline and context information), this section has been fleshed out to incorporate consideration of environmental opportunities in the Glasgow area. Opportunities relate to potential synergies whereby protection and enhancement of the environment can be delivered alongside socio-economic regeneration. This strand was considered particularly crucial given the SEA's limited scope to inform the development and refinement of strategic alternatives and also the importance attached to Games Legacy.

A number of environmental problems and opportunities have been identified from existing PPS, assessments and reports such as the Clyde Waterfront and Gateway Green Network Strategies, Glasgow's City Plan 2 and the East End Local Development Strategy. The SEA aimed to avoid duplicating this work, rather, it aimed to consolidate and supplement it by identifying key gaps and potential synergies. Table 7.1 summarises the key environmental problems and opportunities identified in the SEA process.

Table 7.1 Summary of key environmental problems and opportunities that the CG Strategy and Framework may influence

Key environmental problems, threats and pressures	Key environmental opportunities
People, health & access	
<p><i>Glasgow wide</i></p> <ul style="list-style-type: none"> • Glaswegians experience worse health in general than the average Scot. In particular, incidences of coronary heart disease and cerebrovascular disease deaths are significantly higher than the Scottish average. Susceptibility to these diseases can, in part, be linked to the uptake of exercise and the adoption of a healthy lifestyle. Limited access to attractive outdoor leisure and other low-level physical activity opportunities may be a key barrier to the uptake of outdoor recreation and access in some parts of the City • Many of Glasgow's communities have concerns in relation to the quality of their environment and environmental services primarily in relation to litter and provision of children's play areas. In addition to the above, strong concerns have been raised by south cluster residents in Castlemilk and east cluster residents in Calton and Bridgeton and Parkhead and Dalmarnock in relation to the satisfactory provision of attractive buildings, an attractive environment, a quiet and peaceful environment and parks/ open spaces • Core Paths and cycle route provision within Glasgow focuses on access to and from the city centre along key linear features such as the Clyde and 	<p><i>Glasgow wide</i></p> <ul style="list-style-type: none"> • There are a number of tangible opportunities across Glasgow whereby the development, protection and enhancement of woodland sites could actively contribute to social and health benefits. This includes the provision of 'Commonwealth Community Woodlands' • Provision of attractive environments including publicly accessible amenity greenspace may encourage people to take outdoor low-level physical exercise 'without realising'. Glasgow has a highly significant greenspace resource including many sites that could be enhanced to improve their amenity value. Many of Glasgow's low amenity greenspace sites are coincidental with communities with poorer health • Improvements to signage and/ or other awareness raising activities can bring attention to access and greenspace provision which may encourage increased uptake of outdoor leisure and recreation activities

Key environmental problems, threats and pressures	Key environmental opportunities
<p>Kelvin Rivers. There is currently limited provision within community areas and also between community areas and routes along key linear features. This may be a key barrier to outdoor leisure and recreation and/ or the use of sustainable modes for key journeys (e.g. commuting)</p>	
<p><i>East cluster specific</i></p> <ul style="list-style-type: none"> • Much of the east cluster area suffers from a prevalence of vacant and derelict land sites, many of which are currently designated as 'open semi-natural' spaces. Whilst there is a fantastic opportunity to develop an integrated network of greenspace in the east cluster area, the current provision is very much focused on low amenity sites that are of limited use as a recreational resource and add little landscape or biodiversity value to the area • East cluster communities are home to some of the starkest health inequalities in Glasgow • The size of the east cluster's population has gone through a period of marked decline in recent years. This has compounded the issues already experienced in terms of chronic under investment • The Parkhead/ Dalmarnock area is less well served with accessible high amenity greenspace than other parts of the east cluster area. This may be a key barrier to the uptake of outdoor recreation and exercise 	<p><i>East cluster specific</i></p> <ul style="list-style-type: none"> • The Parkhead/ Dalmarnock area contains a considerable natural/ semi-natural habitat resource. In conjunction with support for biodiversity objectives, there is an opportunity for these types of site to be developed as an integrated network of high amenity public greenspace which may contribute to a removal of barriers to outdoor recreation and exercise • The east cluster area contains a good network of core paths and aspirational core paths that link population centres with the Clyde Walkway, thus providing access to the City centre and other areas. There is a key opportunity to promote walking and cycling use of the area's core paths network and Clyde Walkway as a sustainable, healthy transport option. This may be supported through small scale enhancement projects and improved signage/ awareness raising etc
<p><i>South cluster specific</i></p> <ul style="list-style-type: none"> • South cluster residents living within the Linn and Langside Local CPP area have expressed a number of concerns in relation to the quality of their neighbourhood environment. This issue is particularly pronounced in Castlemilk where a substantial portion of residents find the provision of attractive buildings, an attractive environment, a quiet and peaceful environment, parks and open spaces and children's play areas either 'poor' or 'very poor' • Several neighbourhoods within the south cluster area are relatively poorly served with high quality public greenspace. Key areas affected include Ibrox/ Kingston, Kings Park/ Mount Florida, Toryglen and Castlemilk 	<p><i>South cluster specific</i></p> <ul style="list-style-type: none"> • There is a key opportunity to provide an attractive walking/ cycling link between Castlemilk and Cathkin Braes to encourage uptake of outdoor recreation and improve access to Cathkin Braes Country Park. This could be a key part of the Games' legacy
Wildlife conservation & ecosystem services	
<p><i>Glasgow-wide</i></p> <ul style="list-style-type: none"> • Invasive non-native species represent a key threat to ecosystem functioning and resilience, particularly in riparian habitats. Ad hoc arrangements for the control of invasive non-native species that do not incorporate a plan to restructure the ecosystem are likely to fail 	<p><i>Glasgow wide</i></p> <ul style="list-style-type: none"> • In line with local and national level planning policy, new development within or adjacent to a green network site must demonstrate how it maintains and enhances green network connectivity. Given the scale of current and proposed Games related development in Glasgow (especially in the east

Key environmental problems, threats and pressures	Key environmental opportunities
	<p>cluster area around Parkhead and Dalmarnock), green network provision should be enhanced in line with the scale of proposed development</p> <ul style="list-style-type: none"> • Landscape strategies and projects delivered as part of the CG Strategy and Framework raise a key opportunity for biodiversity enhancement. This is considered to be as important as SuDS provision • Key gap sites throughout Glasgow may be developed as greenspace. If there is a minimum period of 13 years before the site will be developed, Forestry Commission Scotland can fund this type of greenspace project
<p><i>East cluster specific</i></p> <ul style="list-style-type: none"> • Whilst there is a large amount of ‘greenspace’ in the east cluster area, its overall quality is poor and there is little sense of network. Existing greenspace is fragmented, derelict, underused and under performing 	<p><i>East cluster specific</i></p> <ul style="list-style-type: none"> • There is substantial potential and political will for green network development and enhancement to play a key part of the wider strategy for regeneration in the east cluster area. Key opportunities of an integrated and multi-functional green network include SuDS provision (including the development of regional SuDS schemes), improving accessibility to the river from adjoining areas and conserving and enhancing biodiversity through provision of links to other elements of habitat networks • Given its scale, there is an opportunity for east cluster pre-games development activity to take an overarching/ strategic approach to green network, green link and SuDS provision in the area. This could incorporate a strategic approach to biodiversity management within the context of an overall strategy for green network provision • The Athletes’ Village will incorporate a SuDS Masterplan. This may be used as a good-practice framework to inform the development of SuDS strategies elsewhere in the east cluster area
Water bodies & flooding	
<p><i>Glasgow wide</i></p> <ul style="list-style-type: none"> • Various parts of Glasgow are at risk from fluvial (river related) and pluvial (rainwater/ overland flow) flooding. These issues may become more pronounced in light of climate change predictions and the associated local impacts • Increased population, services and industry/ business in the Glasgow area is likely to increase pressure on Glasgow’s water environment, drainage and sewerage infrastructure. This type of issue will be particularly pronounced during Games-time when Glasgow’s population will temporarily increase • Large combined drainage systems have potential to flood during storm events • Many burns and rivers in Glasgow have suffered from historical culverting 	<p><i>Glasgow wide</i></p> <ul style="list-style-type: none"> • Water management can be integrated into the design of urban form including SuDS provision that works towards the protection and enhancement of biodiversity • ‘Greening’ of sites can slow run-off as part of a wider SuDS strategy • National and local level planning policy stipulates that new development must make satisfactory provision for SuDS. This requirement is likely to improve water quality in the City • De-culverting of burns and rivers as part of the Metropolitan Glasgow Strategic Drainage Plan will improve resilience to flood risk and improve water quality, especially the ecological component

Key environmental problems, threats and pressures	Key environmental opportunities
and other hydromorphological changes. This has had a substantial negative impact on the ecology of these water courses	
Air quality, noise & dust	
<p><i>Glasgow wide</i></p> <ul style="list-style-type: none"> • Transport related air pollution and associated issues with poor air quality are key environmental issues in the Glasgow area. The year on year growth in road traffic and associated emissions of key transport related pollutants remains a present and growing concern • Glasgow contains three designated Air Quality Management Areas (AQMA). Given their proximity to several Games venues, transport hubs and accommodation centres, this raises a significant air quality management issue that should be considered in the development of all of the CG Strategy and Framework's provisions 	<p><i>Glasgow wide</i></p> <p>None identified at present</p>
Soils & soil quality	
<p><i>Glasgow wide</i></p> <ul style="list-style-type: none"> • Known and suspected contaminated land; and soil sealing from new development 	<p><i>Glasgow wide</i></p> <ul style="list-style-type: none"> • Where appropriate, temporary and/ or permanent greening of potentially contaminated and vacant and derelict sites can improve greenspace provision whilst delivering phytoremediation
<p><i>East cluster specific</i></p> <ul style="list-style-type: none"> • There are many potentially contaminated sites in the east cluster area with contaminants ranging from heavy metals, chromium, nickel and fuel. There is a particular concentration of contaminated sites around the Parkhead and Dalmarock area 	<p><i>East cluster specific</i></p> <p>None identified at present</p>
Climate change issues	
<p><i>Glasgow wide</i></p> <ul style="list-style-type: none"> • Predicted increases in summer and winter rainfall including increased incidences of extreme weather events will increase pressure on Glasgow's drainage infrastructure 	<p><i>Glasgow wide</i></p> <ul style="list-style-type: none"> • Gap sites/ vacant and derelict land may be used permanently or temporarily for biomass production. This type of use may contribute to carbon reduction commitments and air pollution attenuation
Landscape & the historic environment	
<p><i>Glasgow wide</i></p> <ul style="list-style-type: none"> • Whilst providing a 'template' and context for regeneration and new development, Glasgow's historic environment is vulnerable to inappropriate forms of development. Key sensitivities and vulnerabilities should be considered in the planning and design of all regeneration and new development projects • Previously unknown archaeological remains can present a key constraint to development 	<p><i>Glasgow wide</i></p> <ul style="list-style-type: none"> • Cultural heritage projects throughout the City present a fantastic opportunity for community engagement around local issues including the history of Glasgow's communities • Well designed public realm enhancements using sustainable materials of good quality can help to improve the appearance of important historic parts of Glasgow as well as improving the physical and aesthetic connectivity between different parts of the City

Key environmental problems, threats and pressures	Key environmental opportunities
	<ul style="list-style-type: none"> • Notable features of historic interest can provide an important 'template' and context to base regeneration approaches around
Material assets	
<p><i>East cluster specific</i> None identified at present</p>	<p><i>East cluster specific</i></p> <ul style="list-style-type: none"> • The attractive riverside setting and other key environmental strengths of the east cluster area provide a good 'template' for its ongoing sustainable development including housing, business and wider community development • In addition to Games related development, there is a substantial programme of investment in the east cluster area driving environmental as well as socio-economic regeneration (e.g. contaminated land remediation, green network enhancement etc)

8. SEA FRAMEWORK

The development of SEA objectives and assessment criteria is central to the SEA process. The SEA framework, based on these objectives, provides a way in which potential environmental effects of the CG Strategy and Framework can be described, assessed and compared. The SEA objectives and assessment criteria are described below in Table 8.1.

Table 8.1 SEA Framework

SEA objectives	Assessment criteria
People, health & access	Will the CG Strategy and Framework...
To improve the health and well being of the population	Promote healthy living and lifestyles
	Encourage outdoor recreation and access
	Promote walking and cycling
	Promote environmental conditions which support improved health
	Reduce physical and psychological barriers to outdoor leisure and recreation
Wildlife conservation & ecosystem services	Will the CG Strategy and Framework...
To protect and enhance biodiversity, flora and fauna	Promote the development, enhancement and restoration of a multifunctional green network
	Conserve, enhance and restore the quality and extent of key habitats including those defined in the Glasgow LBAP
	Rehabilitate inappropriately managed areas of habitat
	Reduce the threat of invasive non-native species, especially to riparian habitats
	Increase public understanding of the importance of ecosystem services
Water bodies & flooding	Will the CG Strategy and Framework...
To improve water quality	Protect, maintain and/ or improve water quality in rivers
	Lead to water quality protection and/ or improvement measures
To reduce levels of water pollution	To reduce emissions of diffuse and point source water pollution
	To reduce water pollution by contaminated urban surface runoff
To reduce the risk of flooding	Increase impermeable surface area
	lead to development in floodplains
	Reduce the risk of fluvial and pluvial flooding
	Reduce the risk of drainage flooding
Air quality, noise & dust	Will the CG Strategy and Framework...
	To improve air quality
To reduce levels of air pollution	Reduce emissions of oxides of nitrogen to air
	Reduce emissions of particulate matter
	Avoid exacerbating air quality problems
	Reduce exposure to existing poor air quality
To reduce noise levels from all sources	Reduce or prevent emissions of linear/ nodal source air pollution (e.g. road traffic related emissions, transport hub emissions etc)
	Reduce or prevent emissions of area source air pollution (e.g. domestic emissions from a neighbourhood area)
	Reduce the need to travel
	Reduce traffic congestion
To reduce noise levels from all sources	Preserve environmental noise quality where it is good and in the candidate Quiet Areas
	Reduce noise levels in sensitive locations and in the candidate Noise Management Areas
Soils & soil quality	Will the CG Strategy and Framework...
To reduce levels of soil contamination	Prevent input of pollutants to soils
	Promote the remediation of contaminated soils
	Promote good/ best land management practices

SEA objectives	Assessment criteria
To reduce soil sealing and soil loss	Reduce levels of soil sealing
	Promote the development of brownfield sites
	Promote the use of Sustainable Urban Drainage Systems (SuDS)
	Reduce the sealing of good quality/ versatile soils
Climate change issues	Will the CG Strategy and Framework...
To reduce greenhouse gas emissions	Reduce the need for energy and promote energy efficiency
	Improve land use practices to reduce emissions
	Encourage transport choice and promote modal shift
	Consider the carbon impact of construction phases
To reduce vulnerability to the effects of climate change	Reduce overall flood risk
	Avoid actions that may close or limit future adaptation
	Develop ecologically resilient and varied landscapes as part of a wider strategy for the development, enhancement and restoration of a multifunctional green network
	Consider opportunities presented from climate change impacts
Landscape & the historic environment	Will the CG Strategy and Framework...
To conserve and, where appropriate, enhance the historic environment and cultural heritage	Protect statutory and non-statutory sites and features of historic value
	Protect the site and setting of all statutory and non-statutory sites and features of historic value
	Protect historic landscapes and townscapes
To maintain and enhance the quality of landscapes and townscapes	Protect and enhance landscape character, particularly along the Clyde corridor
	Minimise visual intrusion and protect views
	Protect and enhance local distinctiveness and sense of place
	Enhance the quality of townscapes and the public realm
	Reduce litter and graffiti