Bristol International Airport

Car Parking Solutions Study

Final Report

November 2006

Entec UK Limited

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Report for

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Executive Summary

Forecast for growth

The Government has forecast that air travel will grow by two to three times current levels by 2030. In its White Paper, 'The Future of Air Transport', the Government sets out a framework for the development of the UK's airports to accommodate this growth. The White Paper identifies Bristol International Airport (BIA) as being the airport with the main potential for growth in the South West, with support for development to accommodate around 12 mppa by 2030. BIA forecasts that the number of passengers wanting to fly from the airport will grow from five million passengers per annum (mppa) in 2005 to nine mppa by 2019.

BIA currently provides car parking for its passengers, staff and third parties associated with the airport (e.g. contractors). Any growth in passenger numbers at BIA will require revisions to the amount and type of car parking provision. Therefore, a review of car parking provision is necessary, particularly in respect of achieving the correct balance between surface access to BIA by car and promoting increased uptake of public transport.

This study is an integral part of the ongoing work to review and reassess transport to and from the airport. The output will be the identification of BIA's adopted solution for providing car park facilities to serve an expanded airport. The study is a key element of the design phase of the Transport Assessment (TA) (in preparation) and the Environmental Impact Assessment (EIA) process (in preparation) that will support any future planning application(s).

Strategy prerequisites

The implementation of the Public Transport Strategy and the staff Travel Plan are recognised as key first steps in facilitating the delivery of the adopted car parking solution. This includes the 13% target for public transport use from the draft Master Plan. The potential development of new road infrastructure and improved bus priority measures through the Joint Local Transport Plan will assist with its achievement.

The use of strategic park and ride schemes could also potentially reduce car park demand at the BIA. However, in this study it is concluded that the rural nature of the local road transport network and the dispersed nature of the passenger catchment area means that the operational viability of these facilities is marginal. In partnership with other park and ride developments, their viability may be improved. All of the remote locations should be kept under review as the Greater Bristol Strategic Transport Study evolves and is implemented.

Northside intensification and Silver Zone reconfiguration

Parking at BIA is currently provided at Northside, to the north of BIA, and Silver Zone to the south. The parking in Northside is located in a Green Belt inset, i.e. it is outwith the Green Belt. A key initial aim of this study is to maximise parking at BIA outside the Green Belt. To this aim three different options were examined for this study with the aim of maximising parking at

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Northside. The preferred option (Option C) maximises the provision of additional car parking by utilising multi-storey and decked car parking and provides approximately 7,600 car parking spaces. A greater use of multi-storey car parking in Northside cannot easily be sympathetically achieved given the landform and surrounding visual receptors.

The inclusion of a proportion of decked parking in Northside provides opportunities via selected roofing of the most sensitive sections to reduce noise, lighting and visual issues present in the existing parking arrangements. Green roofing of these decked surfaces would also attenuate surface water runoff (providing a source for rainwater harvesting and re-use) and provide potential for amenity and ecological enhancements. The Northside adopted solution outline design includes an indication of the landscaping and proposed extent of green roof.

Other operational land within the BIA boundary, but that is also within the Green Belt, has been reviewed but there is little scope to increase the car parking provision in these areas.

The intensification of the car parking on Northside includes the reallocation of staff and hire car spaces to the Silver Zone. The implication of this is to reduce capacity for passengers in Silver Zone (given that no multi-storey or decked parking is currently proposed).

Contiguous sites

Given the remaining residual need for car parking and the current unviable nature of the strategic locations remote from BIA, the sequential analysis next considers sites contiguous with BIA's operational boundary. Sites directly contiguous with the current boundary of BIA were selected on the basis of environmental constraints, suitable land access to the A38, and accessibility to the airport infrastructure, together with other operational aspects. A series of five sites were identified for examination in further detail. The balance of environmental and operational viability considerations used in the qualitative assessment indicated that the preferred site to be taken forward into the Master Plan, EIA and TA process was Site 2 (Cornerpool and Cogloop). This site is well screened and is large, offering more space to build in the appropriate level of landscaping, ecological and cultural heritage mitigation and enhancements.

Adopted Solution

The adopted solution from this car park solutions study appraisal is as follows:

- Implement Public Transport Strategy to achieve 13% public transport usage by airport passengers
- Implement a staff Travel Plan
- Expand Northside to include a multi-storey and decking options
- Expand Silver Zone to allow surface parking on an incremental basis

In the first instance Silver Zone should expand by approximately 2.5ha to allow sufficient long stay parking spaces (based on current estimates) for passengers until 2011. Expansion of Silver Zone car parking beyond this extent will be reassessed based on passenger growth and future car parking requirements.

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The outputs from this car parking study will feed into the final BIA Master Plan document. The final Master Plan will set out the preferred option to accommodate future expansion at BIA and this preferred option will be evaluated within both the TA and EIA.

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1. Introduction

1.1 Background

1.1.1 Forecast for growth

The Government has forecast that air travel will grow by two to three times current levels by 2030. In its White Paper, 'The Future of Air Transport', the Government sets out a framework for the development of the UK's airports to accommodate this growth. The White Paper identifies Bristol International Airport (BIA) as being the airport with the main potential for growth in the South West, with support for development to accommodate around 12 mppa by 2030. BIA forecasts that the number of passengers wanting to fly from the airport will grow from five million passengers per annum (mppa) in 2005 to nine mppa by 2019.

BIA currently provides car parking for its passengers, staff and third parties associated with the airport (e.g. contractors). Any growth in passenger numbers at BIA will require revisions to the amount and type of car parking provision. Therefore, a review of car parking provision is necessary, particularly in respect of achieving the correct balance between surface access to BIA by car and promoting increased uptake of public transport.

1.1.2 Draft Master Plan and design evolution

In November 2005 BIA published its draft Master Plan outlining its response to the Government's White Paper. The draft Master Plan outlines BIA's preferred options for future development in the period up to 2015 (which can cater for the forecast passenger growth up to nine mppa by 2019), which includes a larger passenger terminal, additional aircraft parking and increased long-stay car parking on land to the south.

As part of developing its options and solutions to take forward into the planning process associated with future growth, BIA has undertaken a range of technical studies to identify an optimal strategy and design. These include:

- option assessment of key elements included in the draft Master Plan;
- a scoping study as part of the Environmental Impact Assessment (EIA) of the expansion of BIA;
- a Sustainability Assessment of the draft Airport Master Plan; and
- highways modelling and draft Airport Surface Access Strategy (ASAS).

The master planning process included a period of community and stakeholder consultation, which identified that surface access and parking was one of the most significant issues associated with current and future operations at BIA.

The output from the technical studies, the consultation process and discussions with North Somerset Council (NSC) identified a clear requirement to undertake further and more detailed

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assessment of surface access issues, including traffic flows and routing, public transport, and car parking.

1.1.3 Revision of car park provision

Discussions with NSC at the Master Plan Steering Group identified that a review of surface access and car parking should follow a 'top down' approach starting with the re-assessment of the ASAS, leading to a revised consideration of car park demand, an appraisal of potential locations for car parking and finally, an assessment of the effects of car park development upon the wider transport network.

The objective of this review is to deliver an integrated transport solution for BIA that:

- provides the best opportunities for the use of non-car modes of transport for journeys to the airport;
- manages the effects of airport traffic on the highway network in the most effective way possible;
- meets the demand for airport car parking in the most sustainable way; and
- minimises the loss of Green Belt land.

This study is an integral part of the ongoing work to review and reassess transport to and from the airport. The output will be the identification of BIA's preferred solution for providing car park facilities to serve an expanded airport.

The development of the study has integrated specialist inputs from the wider project team including:

- Arup - highway assessment and infrastructure, transport monitoring and modelling, technical advice on surface access issues;
- BIA - car park operations and market, financial appraisal of options, surface access strategy, airport master planning; and
- Entec - study management, review and field assessment of potential sites, appraisal of environmental and planning constraints and opportunities, integration of study findings.

This study is a key element of the design phase of the Transport Assessment (in preparation) and the EIA process (in preparation) that will support any future planning application(s).

The study has been developed within the context of Government guidance in PPG2 (Green Belts) PPS 7 (Sustainable Development in Rural Areas), Air Transport White Paper, South West Regional Spatial Strategy and North Somerset Replacement Local Plan.

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1.2 Overview of existing car parking at BIA

1.2.1 BIA parking catchment

Passengers

A CAA Survey[1] of 2003/04 provides the most comprehensive analysis of BIA's catchment area. These data show that 45% of passengers have an origin or destination in the West of England[2] (see section 5.1 Public Transport Strategy) and that the remainder are widely dispersed. The majority of passengers travel to and from BIA by car (estimated at 81% from CAA and BIA data excluding taxis). Of these passengers, approximately half (i.e. 40% of passengers) use the car parking facilities at the airport.

Staff and third parties

The catchment for staff working at BIA is similarly dispersed. The average journey distance is around 13 miles and the most journeys originate from Bristol, Weston-super-Mare and Bath. Almost all staff drive into work by car, with 93% travelling as single car occupants. A BIA-specific bus service 'The Airport Flyer' is regularly used by just 3% of the workforce. Contractors and other third parties are considered to be even more mobile and have a wider catchment.

1.2.2 Existing parking provision at BIA

BIA is located to the south of the city of Bristol, immediately adjacent to the A38. Its location is shown by Figure 1.1.

The current car parking provision at BIA is divided between an area to the north of the terminal (hereafter referred to as Northside) and a long stay parking area on the south east boundary of BIA adjacent to the A38 (hereafter referred to as Silver Zone). Northside includes:

- self-parking areas for car hire;
- pick up;
- drop off;
- long stay; and
- staff.

Silver Zone currently includes both:

- long stay block-parking (i.e. nose to tail parking) spaces; and
- self-park reception spaces.

[1] Source CAA Airport Statistics 2004

[2] An area encompassing the administrative areas of North Somerset, Bristol, South Gloucestershire and Bath and North East Somerset

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1.2.3 In the vicinity of BIA

The land surrounding BIA is typically rural and agricultural in character. A number of private landowners in the vicinity of BIA have used their land as unauthorised airport car parking. A survey carried out by BIA in 2004 using aerial photographs indicated that approximately 2000 cars were parked in the vicinity of BIA in unauthorised car parks, mainly in fields surrounding, but remote from, the airport's boundary.

North Somerset Council has taken enforcement action against the majority of these car parks. As of 1st February 2006, North Somerset Council had issued 22 Enforcement Notices against unauthorised car parks and 20 sites were still operating as airport parking sites with 24 sites having been closed. Nine appeals by car park operators have been dismissed by Planning Inspectors, primarily because it is inappropriate development in the Green Belt (PPG2). In Appeal Ref: APP/D0121/C/05/2001217, planning permission for a car park at Big Bullock Farm (Park Farm) was not given by the Inspector for airport customer parking "because the harm by reason of inappropriateness and other harm, essentially loss of openness and the visual impact on the landscape is not *clearly outweighed* by any other considerations." A total of 9 appeals had been dismissed and 3 were awaiting determination in early 2006.

As a consequence of this ongoing enforcement action the number of car parking spaces available in unauthorised off airport car parks has reduced and this downward trend is anticipated to continue. Consequently, there will be a need to ensure sufficient legal parking spaces are provided to compensate for this reduction.

Based on the large number of refusals of planning applications for small scale airport car parking by private landowners, enforcement against many owners, and a Planning Inspector's decision not to overturn such refusals of permission at a recent inquiry, it is considered that parking in the Green Belt away from the boundary of BIA is inappropriate, and is highly likely to be refused if a planning application was submitted. Due to these reasons no sites in the vicinity of BIA will be considered for car parking unless the site is immediately adjacent to the airport.

The one exception to this rule is that Lulsgate Quarry will be further investigated for its car parking potential as it is specifically mentioned in the draft Master Plan (paragraph 7.58). This site is investigated in section 8.3 of this report, after strategic car park options remote to BIA have been considered.

1.2.4 Existing strategic parking remote from BIA

There are strategic park and ride sites feeding the larger urban areas around BIA (including Bath and Bristol) with the closest of these located to the south of the Bristol conurbation at Ashton Vale. These are not currently used by airport passengers and staff because there are no dedicated bus services and the hours of operation are incompatible with airport use. The potential for using these sites as airport park and ride will be considered in section 8.2 as part of this study.

1.3 About this document

In the remainder of this document we set out:

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- the policy context of surface transport, traffic and car parking associated with BIA (section 2);
- the approach taken to assessing future car parking needs and options in light of the policy context and the ASAS (section 3);
- a review of what car parking currently exists at BIA (section 4);
- consider strategies put forward by BIA to reduce future car travel and therefore parking demand (section 5);
- a review of predicted demand for future car parking in light of these strategies (section 6);
- an evaluation of the potential car parking solutions within the BIA boundary (section 7);
- potential additional alternative locations to accommodate the residual demand for car parking once the BIA operational site has been explored (section 8); and
- the adopted solution to be incorporated into the master plan and any future planning applications (section 9).

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2. Policy context

2.1 Introduction

In preparing this study, and devising the methodology for identifying the most sustainable location for car parking, careful regard has been paid to the regulatory framework which covers BIA's operations and the surrounding land. It is also important that the proposals to provide the appropriate level of car parking and the approach taken by BIA to maximise use of public transport has its principles established in national guidance, and regional and local planning policies.

2.2 Air Transport White Paper

The Government's White Paper, 'The Future of Air Transport' published in December 2003, sets out a strategic framework for the development of airport capacity over the next 30 years. It identifies the importance of air travel to the national and regional economies, and that:

"Some of our major airports are already close to capacity, so failure to allow for increased capacity could have serious economic consequences, both at national and at regional level. That must be balanced by the need to have regard to the environmental consequences of air travel."

The White Paper sets out a balanced approach to developing this strategic framework which:

- *"recognises the importance of air travel to our national and regional economic prosperity, and that not providing additional capacity where it is needed would significantly damage the economy and national prosperity;*
- *reflects people's desire to travel further and more often by air, and to take advantage of the affordability of air travel and the opportunities this brings;*
- *seeks to reduce and minimise the impacts of airports on those who live nearby, and on the natural environment;*
- *ensures that, over time, aviation pays the external costs its activities impose on society at large - in other words, that the price of air travel reflects its environmental and social impacts;*
- *minimises the need for airport development in new locations by making best use of existing capacity where possible;*
- *respects the rights and interests of those affected by airport development;*
- *provides greater certainty for all concerned in the planning of future airport capacity, but at the same time is sufficiently flexible to recognise and adapt to the uncertainties inherent in long-term planning."*

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With regard to regional airports, the White Paper supports, subject to environmental constraints, growth to serve local and regional demand. In this context the White Paper identifies that the main potential for growth in the South West will be at BIA. Having regard to the environmental impacts that would accompany its expansion, the White Paper supports development to around 12 mppa.

2.3 National Planning Guidance

2.3.1 Planning Policy Guidance 2, Green Belts

Planning Policy Guidance note 2, (PPG2) was published in January 1995, and sets out the Government's policy in relation to proposed developments within Green Belts. Local planning authorities must take its content into account in preparing their development plans and is material to decisions on individual planning applications and appeals.

PPG2 establishes a presumption against development within Green Belts, unless it is required for agriculture or forestry; essential for outdoor sport and outdoor recreation and for other uses which preserve the openness of the green belt; limited extension or replacement of existing dwellings; limited infilling within existing villages and limited infilling or redevelopment of major developed sites. For any other development, very special circumstances will be needed to outweigh the presumption against development.

2.3.2 Planning Policy Statement 7, Sustainable Development in Rural Areas

PPS 7 establishes the Government's policy on rural areas, including country towns and villages and the wider, largely undeveloped countryside up to the fringes of larger urban areas. It plays a key role on supporting the Government's wider economic, social and environmental objectives and for sustainable communities.

2.3.3 Planning Policy Guidance 13, Transport

PPG13 establishes the following principles with regard to the provision of car parking:

- the provision of car parking should be considered as part of a package of planning and transport measures to promote sustainable transport choices;
- wasteful competition between different locations based around the supply or cost of parking should be avoided;
- car parking charges should be set to encourage the use of alternative modes of transport (to the car);
- airport operators should be partners (through Airport Transport Fora) in implementing surface transport initiatives to ensure that access to airports by public transport is enhanced;
- care should be taken to avoid perverse incentives for development; and
- controls over public parking need to be backed up by adequate enforcement measures.

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Annex E of PPG13 provides advice on park and ride developments within Green Belts. The guidance identifies that park and ride in the Green Belt is not inappropriate provided that:

- a thorough and comprehensive assessment has been carried out of potential alternatives (including non Green Belt sites);
- the assessment shows the Green Belt site to be the most sustainable;
- the proposal is contained within the local transport plan; and
- any buildings are essential for the operation of the facility.

In accordance with these policy requirements BIA has set up an Airport Transport Forum, with strategic partners responsible for highways and public transport, and prepared an Airport Surface Access Strategy. The strategy sets out short and long term targets for decreasing the proportion of journeys to the airport by car and increasing the proportion by public transport, for both air passengers and airport workers. BIA's original Airport Surface Access Strategy was published in 2000 as part of the Local Transport Plans of Bristol City Council and North Somerset Council.

2.4 Regional Spatial Strategy

In September 2004, the South West Regional Assembly was designated as the South West's Regional Planning Body, and was required to undertake the production of a Regional Spatial Strategy (RSS) which, under the provisions of the Planning and Compulsory Purchase Act 2004, would become a formal part of the Development Plan, against which proposals would be assessed. It sets out the strategic framework for development in the South West for the next 20 years. The RSS would replace the existing Regional Planning Guidance that was issued in September 2001.

In March 2006, the South West RSS was submitted to the Government Office and issued for public consultation on the 23rd June until 30th August. The aim of the Draft Regional Spatial Strategy is to look forward to 2026 and manage the change and development the South West will need if it is to rise to the challenge of an ever increasing growth in population and to play its role in regional and national prosperity. The RSS will influence planning in the region in a number of ways through:

- being part of the development plan system;
- providing guidance on location and scale of development for Local Development Frameworks (LDF's);
- to interpret and guide investment into local transport and frameworks for the preparation of local transport plans (LTP's); and
- to provide a spatial context for plans and investment from other agencies and organisations in the South West.

Policy SR3 of the RSS identifies that around the built up areas of Bristol, Bath, North Somerset and South Gloucestershire, the boundary of the green belt shall follow the limits of existing development. The policy however, supports the exclusion of the land at BIA which lies to the north of the northern taxiway within the airport boundary.

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Policy TR9 states that existing airports in the region will have to deal with increasing growth in regional demand for air travel. BIA is identified as the SW region's major existing airport and during the plan period will experience significant growth.

2.5 Local planning context

The Joint Replacement Structure Plan was adopted in 2000 and provides strategic polices for the former County of Avon. Under the provisions of the 2004 Planning and Compulsory Purchase Act, it is a 'saved plan' for a three year period or until the RSS is adopted. Policy 61 relates specifically to BIA and encourages the airport to maintain and improve its role in services, with emphasis being placed on improving access by public transport, minimising environmental impacts and respecting the integrity of the Green Belt.

The adopted North Somerset Local Plan was published in 2000 and work is well advanced on the preparation of a Revised Local Plan, with the publication of Proposed Modifications in June 2006, following the receipt of the Inspector's Report. Relevant policies are identified below.

- Local Plan Policy RD5 - Development in the Green Belt says that development that is not for forestry and agriculture, sports, cemeteries and recreation, the reuse of buildings, affordable housing on exception sites, park and ride and for the carrying out of engineering works is deemed inappropriate. This has bearing on BIA which is an existing site that is located within the Green Belt, but is under pressure to expand in order to deal with the increasing growth in air travel.

- Policy T12 - Bristol International Airport sets out the criteria for what kind of future airport development is allowed:

  i. It is required in connection with the movement or maintenance with the movement or maintenance of aircraft, or with the embarking, disembarking, loading, discharge, or transport of passengers, livestock or goods;

  ii. Environmental impacts such as emissions are minimised and noise is not unacceptable for local residents and communities;

  iii. It is suitably sited, designed and landscaped so as not to harm the surrounding landscape; and

  iv. Appropriate provision is made for surface access to the airport, including highway improvements and/or traffic management schemes to mitigate the adverse impact of airport traffic on local communities, together with improvements to public transport services.

  Car parking for the airport will not be permitted except in the following locations:

  a) within the Green Belt inset at Lulsgate subject to iii) above;

  b) in association with overnight accommodation, provided that the number of parking spaces on site does not exceed three times the number of bedrooms;

  c) within the settlement boundary of Weston-super-Mare or within the Weston Regeneration Area, where the provision is planned as part of an integrated

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transport strategy for the town and its links with the airport that contributes to the creation of more sustainable travel patterns.'

The land to the south of the airport is located within the Green Belt and any future development within the existing operational boundary for the airport would normally be deemed inappropriate. This would require exceptional circumstances as stated in PPG 2: Green Belts in order to justify it and this car parking study takes on board this policy framework.

2.6 Greater Bristol Strategic Transport Study

The Greater Bristol Transport Study (GBSTS) has developed a number of transport strategies for the Greater Bristol sub-region and covers the period up to 2031 with intermediate years of 2001, 2016 and 2021. In developing and appraising these strategies the study has made realistic recommendations on transport policy and infrastructure provision across all modes and networks. The strategies have been developed on the basis that proposals need to be both affordable and easily implemented. The strategy, up to 2031, is based on the assumption of a continuing population growth and increasing demand for public transport in the region. The growth in travel demand resulting from the population increase and employment would be significant. However, the growth is constrained by the current transport system's limited capacity.

BIA is identified as a particular area of growth for future travel in the sub-region. The study identifies that public transport to the airport must be enhanced to accommodate the growth in both air passengers and staff working at the airport. The study highlights the current Airport Flyer service as being the foundation for future improvements, and recommends increasing frequency on existing routes, together with new routes to serve the north of Bristol and the Worle interchange. With regard to employees, a demand-responsive or shared taxi operation is considered to be the most appropriate.

The GBSTS also proposes a number of principal highway improvements to handle the predicted increased demand. Of particular importance to improved surface access to BIA are the proposals for a new link road between the A38-A370, the completion of the South Bristol Ring Road, and improved links between south Bristol and the M5.

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3. Approach

3.1 Draft Master Plan car parking options

The Options Appraisal Report[3] described an environmental appraisal of a range of short-listed development options for different elements of the proposed expansion of BIA including car parking. It also considered a number of different option combinations that would represent a draft design for the proposed development. These were subject to a qualitative environmental appraisal, including using a computer generated wireframe model to simulate visual intrusion from different elements. The study identified a preferred design that was taken forward, together with the outputs from a Sustainability Appraisal (SA)[4], into the draft airport Master Plan that was published for community consultation during November and December 2005.

The options appraisal evaluation determined that the preferred location for the proposed multi-storey car parks is a four-deck car park that is indicated in figure 3.1 with the detail around the terminal shown in Figure 3.2. The draft Master Plan therefore included a 3- or 4-storey car park located close to the terminal. This was considered to present minimal visual intrusion above the roofline of the terminal, and would consolidate, rather than expand any encroachment from new buildings. This location is likely to be more flexible and accord best with operational requirements. In the short to medium term, a single western car park would be constructed, with adjacent land safe-guarded for a second car park. Additional surface parking on the south side of the airport was also identified, adjacent to existing surface parking.

These options are considered further in this report, and tested against other alternative options that were highlighted during the consultation period.

3.2 Airport Surface Access Strategy

The Airport Surface Access Strategy has been thoroughly reviewed and updated as part of the work to prepare the Master Plan. A provisional Surface Access Strategy for the period 2006 to 2011 was developed in conjunction with the Airport Transport Forum and work to prepare the new Joint Local Transport Plan. In respect of car parking, the strategy identifies the need to achieve a balanced solution that would:

- maximise the potential for public transport usage;
- maximise the development of operational land outside of the Green Belt; and
- minimise additional non-operational Green Belt land required to accommodate car parking.

[3] Entec. 2005. Environmental Appraisal of Development Options. A report for Bristol International Airport. Entec UK Ltd. Bristol.

[4] Entec. 2005. Sustainability Appraisal of the Bristol International Airport Master Plan. A report for Bristol International Airport. Entec UK Ltd. Bristol.

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The provision of additional car parking needs to be considered in the context of the ASAS. The key issues are:

- the BIA catchment area is predominantly rural with a high reliance on the motor car;
- dedicated airport public transport services are only likely to be viable within the Greater Bristol area;
- the most effective way of growing public transport usage is through the development of the Bristol International Flyer service into Bristol city centre; and
- even with the most aggressive public transport targets the car will remain the preferred choice of transport for the majority of passengers.

Therefore a residual growth in the demand for car parking will remain.

The Air Transport White Paper reached a similar conclusion for BIA when indicating that public transport mode share is low and a direct rail service is not a realistic prospect.

3.3 Public Transport Strategy

BIA has recently reviewed its existing and future public transport provision, developed a more detailed Public Transport Strategy. The review confirmed its aim to significantly increase the use of public transport to 13%. This strategy is set out in detail within BIAs draft Master Plan. In identifying the overall car parking requirements, BIA has sought to establish an overall transportation strategy that includes the requirement for car parking. This review is summarised in section 5 of this report and is used to inform the approach to car parking needs.

3.4 Review of car parking strategy

The target for public transport uptake by BIA passengers and staff, together with forecasts in passenger, staff and contractor growth, and current car park space availability have been used to identify the actual car parking space requirements for the forecast growth in passenger numbers up to nine mppa by 2019.

The approach in this study follows the balanced approach as set out in the ASAS and summarised in section 3.2. It sets the implications of the ASAS on the potential demand for car parking and establishes what the future car parking requirements and strategy should be and how it should be implemented.

3.4.1 Car parking options in relation to Green Belt

One of the key considerations in relation to car parking is the position of BIA within the Green Belt south of the Bristol conurbation. The recent Inspector's Report on the North Somerset Replacement Local Plan, April 2006, recommended that a Green Belt Inset be created to exclude that part of the airport operational area that is situated north of the northern taxiway and east of Cooks Bridle Path (para. 46.16).

On the basis that development in the Green Belt, particularly remote from BIA, would be inappropriate, unless there are exceptional circumstances to justify it, the approach to

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identifying potential car parking options has been to look at the least worst opportunities that could be delivered with as little harm to the integrity and openness of the Green Belt as possible.

The starting point for the study is therefore to seek to maximise the amount of development within the proposed Green Belt inset, so as to minimise the amount of Green Belt that may be required to accommodate additional car parking. A sequential approach has been developed to reviewing potential locations for residual car parking requirements as set out below.

3.4.2 Sequential approach to car parking locations

In consultation with the Local Planning Authority, and to reflect the criteria established in Policy T12 of the Replacement Local Plan and the Inspector's Report, a sequential approach to assessing potential residual car parking locations and options has been undertaken to determine the optimum solution with respect to the proposed expansion of BIA (e.g. environmental effects, planning policy, legislation, viability and financial implications). The sequential approach is as follows:

- operational land within the proposed Green Belt inset;
- operational land outside of the Green Belt inset;
- strategic park and ride locations remote from BIA; and
- sites contiguous with BIAs current boundary within the Green Belt.

The aim of the sequential approach is to ensure that all potential development options are appraised before moving onto the next area of search in the sequence (see Figure 3.3). The approach maximises the use that is made of BIA's operational land, both inside and outside of the Green Belt, before looking at land outside of the existing boundary. Section 8 sets out the outcomes of this review and the adopted outcomes are summarised in Section 9.

3.5 Transport Assessment and EIA

The draft Master Plan, together with the community consultation responses have been used to inform this car parking study and have also been taken forward into the Transport Assessment (TA) and the formal EIA. Both of these latter studies are now under preparation. The outputs from this car parking study will feed into the final Master Plan document. The final Master Plan will set out the preferred option to accommodate future expansion at BIA and this preferred option will be evaluated within both the TA and EIA.

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4. Existing airport parking provision

4.1 Types of parking at BIA

BIA follows the typical UK practice for the segmentation of its car park products. These different types of car parking are classified as set out in Table 4.1.

Table 4.1 Type of car parking at BIA

Car park product	Customer market	Duration of stay	Location
Short stay	Short stay drop off;	1-2 hours;	Northside - close to terminal building, (100m walk)
	Short/medium passenger stays (premium charged compared with long stay car parks).	12-48 hours	
Rapid pick up	Passenger pick up (taxi, friend/relative, courtesy minibuses)	< 2hours	Northside - close to terminal (100m walk)
Navigator car park	Frequent/business travellers who are members of the airport loyalty scheme (small discount offered compared with daily short stay rate).	>24 hours	Northside - close to terminal (100m walk)
Long stay car park	Long stay car parking, flexible stay length, no advance booking, short transfer to terminal. Mainly non-leisure or short duration stays	>24 hours, <4 days, but no restriction.	Northside – slightly further away from terminal than other products
Long stay block-parking	Pre-booked car park offering a discount on the gate price. Cars block parked by car park staff to maximise land use	>4 days	Silver Zone

4.2 Existing quantity and location of current car parking

The current car parking provision at BIA is divided between Northside, and Silver Zone (which is long stay parking area on the south east boundary of BIA adjacent to the A38-see Figure 1.1). All of this current car park provision is surface parking (i.e. there is no decked or underground parking).

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Northside includes self-parking areas for car hire, pick up, drop off, long stay and staff parking amounting to approximately 5,290 spaces located in the Northside car parks. Self-parking spaces allow drivers to park themselves and require approximately 25sqm per space.

The current Northside car park layout results in a proportion of spaces (approximately 15%) being unusable because of 'misparking' (i.e. cars parked in a way that takes up more than one space). The number of usable spaces will therefore be around 4,500, taking misparking into account. The car park layout has been reviewed to see if the misparking issue can be eliminated by redesign. It has been concluded that the misparking occurs as a result of an over dense car park layout with the spaces closer together than would normally be recommended. Re-design of the car park would not increase the number of spaces available.

Silver Zone accommodated approximately 6,300 block parked cars at its peak capacity in 2006. Passengers using block-parking drop their car off at a reception area from where it is moved by staff and parked nose to tail with other vehicles. Block-parking requires approximately 18sqm per space (16sqm plus an allowance for reception and primary access routes). Depending on layout Silver Zone could potentially accommodate around 9,300 car parking spaces, most of which would be block car parking but which would also include some self parking reception spaces. Table 4.2 provides a summary of existing car park space provision at BIA.

Table 4.2 Existing car parking spaces

	Northside	Silver Zone	Total
Short stay & pick up	531	0	531
Long stay (self)	3400	0	3400
Long stay (block + reception)	0	9300	9300
Navigator	354	0	354
Staff	665[5]	0	665
Hire	340	0	340
Total	**5,290 spaces**	**9300 spaces**	**14,590 spaces**

[5] 200 staff cars are accommodated in the north side long stay car park

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4.3 Car parking tariffs at BIA

Car park tariffs at BIA are set with reference to:

- normal practice at UK airports;
- the needs of customers;
- the cost of alternative modes of transport, and alternative car park arrangements;
- the need to provide a commercial return to BIA; and
- the convenience offered by the car park product and its relationship with the terminal building.

The short stay car park is aimed primarily at those customers wishing to stay for less than 24 hours. It is available for customers wishing to stay for longer who are prepared to pay the premium price of £16 per day in return for the close proximity to the terminal. The rapid pick up car park is priced to discourage stay lengths of longer than 3 hours.

The Navigator car park is priced at £15 per day for Navigator members. It is aimed at business users and scheduled airline frequent flyer gold card members. It is offered as a benefit to these high value air passengers and is mainly used as shorter term parking.

The long stay car park is priced at between £5 and £10 per day depending on stay length with the pricing structure benchmarked against practice at other UK airports. A discount of up to 33% is offered on these prices for passengers who pre-book their car parking (the 'EarlyBird' offer). The discount increases depending on the timing of booking with the maximum discount available for booking 28 days in advance. Pre-booked customers will be automatically directed to the Silver Zone car park for stay lengths in excess of 4 days. Cars staying at Silver Zone for stays in excess of 4 days will be 'block' parked. This practice is not viable for stays of less than 4 days.

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5. Strategies to reduce future car travel and parking demand

5.1 Public Transport Strategy

5.1.1 Draft Surface Access Strategy

The draft ASAS proposed that the proportion of passengers using public transport should rise by 10% per annum with a proposed target of 13% of passengers using public transport at 9 million passengers per annum. This target was derived by extrapolating recent performance of the airport's public transport operations. The Strategy included the following objectives:

- increasing the proportion of passengers using the Bristol International Flyer coach service to Bristol, by increasing its frequency, reliability and convenience;
- improving the local bus services, to include new services to destinations such as Weston-super-Mare;
- improving coach services to the airport from outside the West of England;
- providing controlled expansion of airport car parking with pricing mechanisms to encourage the use of public transport;
- making efficient use of the highway network by airport traffic; and
- promoting sustainable staff travel opportunities.

The draft Master Plan indicates that around 5% of passengers currently use public transport (i.e. public service bus) for the journey to or from the airport.

5.1.2 Methodology for reviewing the Public Transport Strategy

The following approach has been used to establish a revised Public Transport Strategy:

- consider the general use of public transport within England, the South West and within the West of England sub-region. Benchmark the use of public transport at BIA with usage at other airports in the UK. Establish a context for public transport use within which the BIA target can be considered;
- assess the distribution of passengers using BIA within the catchment area, both now and in the future;
- assess the likely growth in public transport use by passengers in the wider catchment area (outside the West of England) based on a projection of current travel patterns;

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- use the catchment area analysis to identify concentrations of passengers that might generate demand for new dedicated public transport services in the West of England;
- use the current public transport behaviours to assess the likely usage of new bus services; and
- take forward into the Public Transport Strategy, those services that are likely to be sustainable.

5.2 Public transport: national and regional context

Data relating to the general usage of public transport across England, the South West Region and the West of England sub-region is available from the 2001 Census figures for travel to work patterns. This information provides a good proxy indicator of the attractiveness and viability of public transport services by administrative area. Whilst this data is now five years old the Department for Transport annual transport statistics[6] indicate that there has been little change in public transport usage in the intervening period.

Across England and Wales 15.9% of all those working in the week before the census, who travelled to their workplace, used public transport. The national figure is skewed heavily by the high proportion of people using public transport in London compared with the regions. The South West Region has the lowest use of public transport of any of the English regions with a figure of just 6.8% using this mode of travel. Only two English regions (North East and Yorkshire and Humber) achieve a proportion of passengers using public transport for journeys to work that is higher than the 13% proposed for passengers at Bristol International Airport at 9mppa.

Table 5.1, below, the data relating to public transport use for nine major cities in England and Scotland and their corresponding airport.

[6] Transport Statistics Bulletin GB: 2005 Edition, Department for Transport 2005.

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Table 5.1 Public transport use - city vs. airport

City	% travel to work by public transport	% airport passengers by public transport
Birmingham	24.7%	22.3%
Bristol	14.6%	5.0%
Liverpool	26.1%	10.1%
Manchester	26.5%	10.3%
Newcastle	27.2%	11.2%
Nottingham	23.7%	3.5%
Glasgow	34.5%	11%
Edinburgh	28.2%	20%
London	42.1%	35.5%[7]

These data suggest the following:

- No airport listed achieves higher public transport use than its neighbouring city.
- Location, size and traffic mix seem to be important factors in the delivery of public transport services. Birmingham and Edinburgh Airports are the only airports outside London that achieve a proportion of passengers using public transport that is higher than 13%. Birmingham's achievements are probably a feature of the airport's close proximity to the suburbs of the UK's second city and other principal urban areas in the West Midlands (e.g. Coventry). It is also adjacent to the London to Birmingham mainline railway. Edinburgh's high proportion of public transport use is understood to be attributable to high usage by business travellers and inbound tourists, both of whom are likely to require onward travel arrangements to the city centre.
- Smaller airports such as Bristol and Nottingham East Midlands achieve lower public transport usage suggesting that there is a factor relating to size which governs public transport use. However Manchester, the third largest airport in the UK in terms of passenger numbers achieves a modest 10.3% of passengers using public transport, in spite of having a dedicated rail link to the airport.

[7] Figure for Heathrow. Stansted and Gatwick are similar.

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5.3 Public transport: local context

The 2001 Census indicates that between 7.2% and 14.6% of the populations of the four unitary authorities making up the West of England use public transport for journeys to work. North Somerset has the lowest average at 7.2%. The Final Joint Local Transport Plan 2006/07 to 2010/11 includes data compiled from the GBSTS survey which indicates that public transport use for shopping, school/college and leisure is lower than usage for journeys to work.

2001 Census provides data relating to public transport use across the wards and towns in the West of England and Somerset has been used as an indicator of potential use of public transport by passengers using BIA.

5.3.1 BIA catchment area

The CAA Survey of 2003/04 provides the most comprehensive analysis of the airport catchment area. This shows that 45% of passengers have an origin or destination in the West of England (North Somerset, Bath and North East Somerset, Bristol and South Gloucestershire). This comprises 25% from Bristol, 7.4% from North Somerset, 7.3% from Bath and North East Somerset and 5.5% from South Gloucestershire. Somerset and Devon accounted for 10% and 13% of passengers respectively. The principle urban areas of Exeter, Plymouth, Cardiff, Swindon and Taunton each accounted for between 2 and 3% of passengers. The dispersed nature of the catchment area outside the West of England suggests that the greatest potential for dedicated airport public transport services lies within the West of England.

Rail access

A number of consultees commented on the lack of a direct rail link to BIA and saw the need to develop a link as a prerequisite for future development. The provisional surface access strategy and the draft Master Plan concluded that a rail link was not a realistic prospect. Whilst it may be technically feasible to develop such a link, in reconsidering this issue it is relevant to note:

- the RASCO study indicates that heavy rail is only a realistic option for airports handling in excess of 15 mppa;
- for airports in the 5 to 15mppa category light rail may be an option. However the viability of light rail has been reassessed since the RASCO work was undertaken and most light rail schemes have been dropped due to their poor financial performance;
- a rail link to Bristol International Airport would only ever be a spur link from the mainline and would not avoid the need for a change of trains at Bristol Temple Meads;
- no specific studies have been commissioned into the feasibility of a rail link to BIA but an indication of the potential cost of such a scheme can be gained by considering schemes being considered elsewhere. Plans for rail connections to Glasgow and Edinburgh Airports are being brought forward by authorities in Scotland with an estimated cost of £140m for Glasgow and £500m for Edinburgh. The challenges of the terrain between the airport and Bristol would suggest that a rail scheme for Bristol would be likely to be at the higher end of this range; and

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- a completely new route for a rail link would be required with complex structures and earthworks required along the route. Any route could have significant environmental effects given the constraints present in the open countryside between Bristol and BIA.

The revised public transport strategy therefore reaffirms the airport's commitment to coach based public transport using Bristol Temple Meads as the primary rail head for the airport. The use of Worle Parkway or Nailsea and Backwell stations as secondary rail heads is discussed under the section on bus services below. The rail network will be the primary means of accessing the wider catchment area by public transport.

Long distance bus services

The long distance (National Express) bus services through Bristol generally leave or join the M5 at Junction 18. A significant journey time penalty is incurred by routing these services via the airport, the A38 and junction 22 on the M5. This remains a significant barrier to the delivery of direct long distance services for which there is no short term solution given the local road network around the airport and M5.

However National Express do operate a number of long distance overnight services for which the journey time is less critical. Since March 2006 the 404 and 405 services between Penzance and London have been routed via Bristol International Airport. The initial indications are that these services are proving quite popular with passengers and there may be further potential for more services of a similar nature. The Public Transport Strategy therefore assumes that direct National Express services can deliver 20,000 annual passengers.

Further National Express passengers will be generated by connecting services through the Marlborough Street Bus and Coach Station. Although patronage of National Express services by airport passengers has been in steady decline in recent years measures are being taken with National Express to reverse this situation. Nevertheless long distance coach services are likely to remain secondary to the rail network for the delivery of passengers by public transport generally.

There is further potential for regular services from the outlying areas of the catchment area by coaches and taxi minibuses operating in conjunction with the travel agent network. This is already a feature of journeys to the airport.

5.3.2 Dedicated bus services - Bristol International Flyer

Public transport provision to the airport in the future will fall into two categories.

- links to public transport interchanges providing connections to the wider public transport system (i.e. the Bristol International Flyer); and
- bus services to destinations within the airport catchment area.

Analysis of the current usage of the Flyer suggests that around 90% of the air passengers are using the Flyer in conjunction with the rail, rural or national long distance bus service via interchanges in Bristol. For 2005 this would suggest that around 4.23% of air passengers used the Flyer to connect onto other transport services. This proportion will increase in the future as a result of:

- increasing proportion of inbound passengers;

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- better integration with the wider public transport system;
- marketing and increased awareness of public transport opportunities;
- improvements to the wider public transport system; and
- technology - improved ticketing and information systems.

A target of increasing the 4.23% component of public transport by 5% per annum is therefore proposed based past performance, and an assessment of the opportunities available. This would translate into a target of 8.4% of passengers using the Flyer for connecting services at 9mppa.

5.4 New dedicated bus services

The CAA survey provides information on the distribution of passengers down to district level. In order to determine the potential for public transport services an estimate of passenger numbers by town and/or ward is required. The 2001 Census population statistics provide further detail on the distribution of population within administrative areas. An estimate of the variation in propensity to fly from ward to ward has been made using data on bookings provided by easyJet. By combining the two data sets it has therefore been possible to produce an estimate of the distribution of air passengers within the West of England and Somerset, and hence the number of air passengers from each location at various stages in the growth of the airport. The likely take up of public transport services on a route by route basis can therefore be determined using the estimate of passenger numbers on the proposed route and a target proportion of passengers that would use the service derived from the current usage of public transport in that area. The road network and journey time are also considerations in the assessment. The routes that have been considered are set out below.

5.4.1 Airport to Clifton and Westbury-on-Trym

This service would target the city centre and its hotels and business district; the residential and business areas of Clifton; the university and the residential areas of Stoke Bishop, Henleaze and Westbury-on-Trym. The assessment shows the route should be viable and a service, initially to Blackboy Hill, is being introduced in Summer 2006. This will be routed via Bristol Temple Meads station, increasing the frequency to the station to every 15 minutes. This route is targeted to serve 1.2% of total air passengers.

5.4.2 Airport to Bristol Parkway Station

This route has been identified as a potential new service by the Greater Bristol Strategic Transport Study. Two potential routes suggest themselves:

- city centre, M32, Avon Ring Road, Filton Road; and
- city centre, Gloucester Road, Horfield, Filton.

Of these the latter has the greater potential for bus patronage. However the estimated demand is low at around 0.4% of air passengers. A dedicated service to Parkway therefore seems unlikely to be viable purely on the basis of airport passengers. However the Gloucester Road is currently served by numerous bus services including the 73 to Parkway Station. A potential option is therefore to extend/adapt this route to include an extension to the airport. This in turn could

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serve to increase the frequency between the airport and the city centre. This option is therefore carried forward into the Public Transport Strategy on this basis as a longer term possibility and demand will be regularly monitored.

5.4.3 Airport to Portishead, Clevedon, Nailsea and Backwell

This service would provide access to the three major towns of North Somerset outside Weston-super-Mare, which are estimated to provide 2.15% of the air passengers at BIA or 193,500 passengers at 9mppa. Based on the current usage of public transport and the journey times involved it seems unlikely that the route would achieve the level of patronage required to achieve a significant environmental benefit or to be commercially viable. Proposals for a service to Nailsea and Backwell Station are considered below.

5.4.4 Airport to Bath

Around 3.6% of air passengers are estimated to be travelling to or from Bath. At present a number of passengers use the indirect public transport route offered by the Flyer and rail via Temple Meads. With frequent services between the airport and Temple Meads and between Temple Meads and Bath this route offers a journey time that is generally better than could be offered by a direct coach service, albeit with the inconvenience of changing modes at the railway station. A new direct coach service would also involve the displacement of passengers from rail to bus.

The quickest route is via the B3130 through the Chew Valley but such a service must rely solely on the Bath/Airport point to point traffic. The business case for such a service is marginal, even at 9mppa. However the alternative route via Saltford, Keynsham and South Bristol shows more potential and as passenger numbers approach 9mppa this service is likely to become a viable option serving up to 1.1% of passengers. The demand for this service will therefore be regularly monitored, with a likely introduction as passenger numbers approach 9mppa.

5.4.5 Airport to Weston-super-Mare/Worle

Weston-super-Mare is estimated to account for around 2.1% of passengers through BIA, or 189,000 passengers at 9mppa. The route is currently served by the 121 service operated by First. North Somerset Council in their response to the Master Plan consultation have suggested that further consideration should be given to the possible role that Worle Parkway station and the Weston Vision could serve in delivering an integrated transport solution. The following options have therefore been considered:

- Maintain and develop the existing 121 service. This service serves the rural community and is supported by North Somerset Council. Up to 0.2% of air passengers use the service but there is little scope to grow this proportion. It does not serve Worle and to do so might be to the detriment of its rural customer base.

- Develop a new service between Weston or Worle and the airport. The Weston Area Development Framework prepared by English Partnerships, North Somerset Council and the South West Regional Development Agency includes a number of proposals for transport infrastructure and public transport, including proposals aimed at improving the strategic links between BIA and Weston. The Development Framework and the draft RSS propose major development between Weston/Worle and the M5, including new local highway infrastructure. The

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GBSTS has identified a route for a new strategic road link between Weston and Bristol via BIA. Worle Station has also been identified as a park and ride site (see section 8) and as a transport interchange.

In conjunction with these proposals the Area Development Framework suggests that a high quality bus link should operate a 20 minute frequency linking Weston town centre, Worle Station, RAF Locking and BIA. These are ambitious long term proposals and clearly a number of measures need to be put in place before such a link can be implemented. In the meantime the catchment area analysis suggests that there is little demand for a dedicated service to Worle. In particular the current bus journey time between Weston and Worle is a significant disincentive for use by air passengers. However should the Area Development Framework proposals come to fruition then the situation will clearly be quite different. BIA will therefore monitor this situation and reconsider the need for such a service as proposals are realised. In the meantime Worle Station is considered in the Staff Travel Plan for the use of airport employees.

5.4.6 Rail/bus using Nailsea and Backwell Station

Nailsea and Backwell station is an easy ten minute bus journey from the airport, assuming agreement could be reached on the use of the Downside Road entrance for the bus. It is well connected to Clevedon and Nailsea with the 364 bus service and train services from Taunton, Bridgwater, Burnham and Highbridge, Weston, Milton and Worle call here, generally once an hour. A shuttle bus service would also serve Backwell and could link with the X1 bus service between Weston-super-Mare and Bristol. At present the journey time from Worle to the airport using rail/bus is likely to be slightly better than a direct bus from Worle.

The Nailsea and Backwell Station is therefore a viable option that BIA wish to implement as part of the surface access strategy, pending any future delivery of plans for the Weston Vision and Worle Station. The service is likely to require a subsidy but overall it is expected to make a worthwhile contribution to the surface access strategy. However, there are some practical consideration around access and other issues that require further investigation by BIA and First. For example, it is not possible to turn a bus at the station so it may need to carry on to Nailsea and turn there.

5.4.7 Airport to Taunton, Bridgwater and Burnham

The catchment area analysis suggests that this route has no realistic prospect of being commercially viable. The Nailsea and Backwell shuttle referred to above provides an alternative for these passengers.

5.4.8 Community bus services

The Chew Magna ‘Go Zero’ environmental project and the Dragonflyer ‘dial-a-ride’ scheme has shown community based bus services might be developed to service commuters to Bristol and passengers alike. There is considerable scope to develop these services in the future and this will form a component of the surface access strategy off-setting journeys by commuters by using the Flyer.

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5.5 Summary of proposed bus services

The proposed public transport strategy and the proportion of passengers each service will carry are provided in Table 5.2 .

Table 5.2 Passengers on proposed future bus services

Service	Proportion of passengers
National Express direct services	0.2%
Bristol International Flyer	8.4%
Clifton/Westbury-on-Trym	1.2%
Bristol Parkway Station	0.4%
Bath/South Bristol	1.1%
Nailsea and Backwell/Weston/Taunton/Bridgwater	0.3%
121 to Weston	0.7%
Other services (community/minibuses)	0.2%
Total	**12.5%**

5.6 Implementation of the Public Transport Strategy

The 13% target included in the draft Master Plan is therefore considered an ambitious and stretching target but nevertheless it is retained as BIA's goal. The potential delivery of new road infrastructure and improved bus priority measures through the Joint Local Transport Plan will assist with its achievement.

The adjusted modal split that will arise from the strategy has been calculated using the 2003/04 CAA survey figures for the origin and destination of passengers. The analysis has been carried out on a district by district basis based on the proposed routes. It has been assumed that the shift to public transport can be distributed across other modes pro rata the current access proportions. The future modal split resulting from the surface access strategy is given in table 5.3 below.

Table 5.3 Modal split for passenger journeys to BIA

Journey mode	Proportion of passengers	
	2005 (4.6mppa)	**2015 (9mppa)**
Bristol International Flyer	5%	9%

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Public bus	Included above	4%
Other bus	2%	1%
Car dropped off	36%	32%
Short stay car park	2%	2%
Long stay car park	38%	35%
Hire car	5%	5%
Taxi	12%	12%

These figures have been used to develop the forecasts for car parking demand in this study and are included in the Master Plan.

BIA will be developing this strategy in conjunction with First to develop the services identified above. The philosophy will be as follows:

- Development of the public transport services out of BIA is critical to the future success of the airport. The commercial arrangements for public transport are therefore based on a partnership with First. The airport company currently retains responsibility for the operational features of services.
- Development of services requires close integration with and development of the existing public transport network. Few services are viable on their own and the public transport strategy needs to concentrate on delivering a quality corridor of services into the city centre.
- Air passengers demand a premium service, and will view the standard mass transportation approach of the public service bus as unattractive. The public transport strategy aims to provide a first class experience using a coach, rather than a bus. This provides better ride quality and comfort. The vehicle used has been re-evaluated on a number of occasions. The Aircoach service operating out of Dublin Airport provides the benchmark for such a service.
- Bus services through towns and cities will need to take routes with the greatest density of passengers living nearby. These will not be the routes used by cars or taxis for point to point journeys and bus journey times are therefore inferior to car journey times. In order to overcome this bus services need to offer comfortable, reliable and frequent services. For many passengers these features will compensate for the longer journey time.
- Airport services will have a distinctive livery to identify it and to differentiate it from the public service bus.
- Most of the Flyer passengers (currently) use the service to connect with the wider public transport system, particularly the rail network. Increased patronage will be obtained by working successfully with other transport operators to ensure that the Flyer is properly integrated into the wider network.
- Technology and bus priority measures will be used to improve reliability and journey times, working in conjunction with the local highway authorities.

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- A close working relationship with the public transport operators and highway authorities is required through the Airport Transport Forum.

Services will be brought forward as passenger numbers grow over the years to 2015 and the Surface Access Strategy will be reviewed as significant passenger number milestones are reached.

5.7 Staff Travel Plan

BIA currently operates a number of initiatives aimed at reducing staff reliance on the car for their journeys to work. The Bristol International Flyer coach service to Bristol, for example, is free for all airport staff. However in spite of this the use of the car by staff remains high. Consequently a formal Staff Travel Plan is being implemented to promote and encourage alternative means of travel to and from the Airport and reduce single occupancy car journeys by staff. Importantly, the Travel Plan will help to ensure that BIA can recruit and retain key staff and also meet its public transport strategy target.

The Travel Plan includes the following targets:

- to reduce the proportion of staff who commute on their own by car from 93% to 75%;
- to increase the level of those who commute as a car passenger approximately fourfold to 15.5% (currently 3.9%);
- to treble the proportion of staff who use bus based services from 2.5% to 7.5%;
- to achieve 1% cycle mode share; and
- to achieve 1% powered two wheeler mode share.

Ten key measures have been identified as part of the implementation of the staff Travel Plan. These are as follows:

- easy-to-use car sharing scheme;
- extension to the Flyer airport express coach service;
- staff only minibuses serving wide area and shift times;
- an improved secure staff car park with fairer charging policy;
- a staff travel incentive scheme;
- better information and promotion of travel options;
- a staff travel website with information and live travel news;
- a Travel Plan Coordinator to help with travel needs and journey planning;
- cycle facility improvements and cycle purchase scheme; and
- initiatives to reduce business travel impact.

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The demand for staff car parking has been reassessed to reflect the Travel Plan proposals. The unconstrained demand for staff car parking based on current usage is estimated to be 1,400 spaces at 9mppa. This reduces to 1,200 spaces with the implementation of the Travel Plan.

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6. Future demand for airport parking

6.1 Future demand forecasts

6.1.1 Long stay car parking demand

Based on an analysis of 2004 data the draft airport Master Plan indicated that the estimated number of cars to be accommodated in the long stay car parks could rise to 15,200 on an unconstrained basis. Experience since then indicates that this may be an underestimate of future demand. The number of spaces required to accommodate this number of cars depends on a number of factors, particularly the type of car parking product provided. Long stay car parking is envisaged to be provided in the following product categories, shown in Table 6.1 below.

Table 6.1 Long stay car park products

Product	Customer market	Location requirements
Premium long stay	All stay lengths, but main market likely to be high value mid-stay leisure/business/weekend	Within 5 minutes walk of the terminal building. Self-park
Long stay gate	Main market business and leisure mid stay length. Pre-book and pay on departure.	Within easy reach of the terminal building (5 minutes coach transfer). Self-park
Pre-book long stay	Mid to long stay leisure market	Less location sensitive – with 15 minutes coach transfer. Block-park

The current booking trends indicate that 25% of car park spaces are required for the long stay product with 75% of spaces accounted for by pre-book customers. The passenger forecasts indicate that the proportion of business passengers using BIA will grow from 20% in 2003 to around 26% in 2015. The future allocation of spaces by product has to take this into account and the fact that the long stay products peaks at a different time of year than the pre-book product. Therefore, the forecast long stay parking product split in number of cars is:

- Premium long stay 765 cars;
- Long stay gate 4,420 cars (including pre-book 1 to 4 day stay lengths)
- Pre-book long stay 9,600 cars (including reception area).

The number of spaces and the allocation of land for car parking needs to take account of differences in space efficiencies between self-park and block-park. Assumptions have been made regarding the take up of premium long stay spaces based on experience at Birmingham Airport which now offers a similar product. However it is difficult to accurately assess the take up at Bristol based on the Birmingham market and this assessment is therefore based on the professional judgement and the experience of BIA staff.

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As noted in the BIA Master Plan current estimates of future car parking requirements rely on a number of assumptions relating to factors that influence demand. These include factors such as passenger behaviour and travel patterns and the future of unauthorised off-airport car parks. Many of these issues are outside the direct control of BIA.

The demand estimates used in this study should therefore be considered as a guide to future requirements rather than as a definitive requirement. Projections may need to be adjusted up or down as a result of knowledge gained in the future. The land use allocation for future parking requirements will therefore need to retain some flexibility to reflect these uncertainties.

The land use requirements are also sensitive to how the car parks are managed. The allocation of spaces between block/valet and self parking, between north and south of the airfield and the utilisation of spaces at peak are important factors. This study has used the figures from the BIA Master Plan to determine the land requirements for car parking. The figures are based on a number of reasonable assumptions, however these assumptions will need to be regularly revisited based on operating experience. The land use allocations recommended in this report may therefore need to be adjusted accordingly.

Taking into account the likely management regime and utilisation it has been concluded that future demand should be planned on the basis of 18,100 spaces being required for passengers. This allows a small margin for flexibility to allow for uncertainties in the forecasts. This estimate includes an adjustment for the predicted future increase in public transport use. The number of spaces that would be required if passenger demand was unconstrained by increases in public transport is approximately 19,700.

6.1.2 Staff parking demand

Staff travel plan initiatives will be undertaken which will constrain the number of staff car parking spaces that will be required from 1,400 spaces to 1,200 spaces.

6.1.3 Predicted car parking space requirements

The constrained number of spaces required for car parking for long stay and other categories of use has therefore been predicted as a total of 21,150 spaces and is split as follows:

- long stay (self-park) 6,100 (premium and gate)
- long stay (block park) 12,000
- short stay (incl. pick up) 700 spaces
- navigator 500 spaces
- staff 1,200 spaces
- car hire 650 spaces

6.1.4 Financial assessment of structures to accommodate long stay car parking options

A detailed financial appraisal has been undertaken of various options to extend the airport car parks. Using standard project assessment criteria it has been concluded that multi-storey and decked car parks can produce a positive net present value provided a premium can be charged to

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the current tariff structure. The elasticity of the market to such a premium is unknown but provided the provision of car park spaces can be controlled the development of such car parks may be an option. Projections of the split between products becomes more speculative further into the Master Plan period and regular reviews of the success of the car park management and public transport strategies will be required and are proposed.

6.2 Planned vs. unauthorised parking

The past five years have seen a proliferation of unauthorised car parks being set up in fields and semi-brownfield sites around the airport without formal planning permission. North Somerset Council has taken vigorous steps to curtail these operations through enforcement action which was first authorised in 2003. In taking this action the Central Area Planning Committee, at its meeting of 5 June 2003, raised a number of concerns about airport policies and suggested that the high cost of car parking at the airport, together with the limited number of bus and taxi operators servicing the airport helped to encourage the proliferation of unauthorised car park sites.

The strategy for curtailing the unauthorised sites has therefore centred on taking effective enforcement action and removing the need for these sites by offering a discount airport parking product through the EarlyBird offer. The current pre-book EarlyBird rate of £29 per week is now one of the cheapest car park offers at any UK airport.

The strategy has proved to be successful and the number of unauthorised car park operators is now reducing. However it is thought that this situation remains very sensitive to price and a small increase in price could reverse the trend. The opportunity to use price to manage demand for car parking is therefore limited. It is therefore unlikely that the market will be able to support a significant increase on the £29, Early Bird rate in the short term with an increase to £35 probably being the most that could be contemplated in the short term. Coupled with the Public Transport Strategy, this small increase in pricing may help to increase the potential use of public transport.

The web based booking systems are becoming increasingly sophisticated and it is now possible to use ‘yield management’ systems, such as those used by low cost airlines to relate the price of the car parks to the level of demand. Such a system could limit the proportion of spaces available at the cheapest price according to demand, and by so doing optimise the use of the car parks.

The Master Plan proposal to increase the availability of spaces within the immediate vicinity (convenient walking distance) of the terminal building provides an opportunity to provide a new pre-book premium long stay product. A potential typical weekly rate for parking in the multi-storey car park might be £59. Such a product is untried at Bristol so there is some uncertainty about demand and long term success.

6.3 Strategy impacts on car parking spaces required

Taking into account BIA’s aim of achieving 13% of public transport use and enhanced measures to reduce car use by staff, the overall car parking requirement for 9mppa is considered to be approximately 21,150, reduced from a predicted unconstrained requirement of approximately

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22,950. Table 6.2 shows the current car parking capacity together with future requirements for2015 (9mppa) and the predicted shortfall in spaces.

Table 6.2 Adjusted future car parking spaces requirement

Type	2005	2015	Short fall
Short stay & pick up	531	700	169
Long stay (combined)	12,700	18,100	5,400
Navigator	354	500	146
Staff	665	1,200	535
Hire	340	650	310
Total	14,590	21,150	6,560

Given the numbers set out in Table 6.2, the shortfall in parking spaces to meet the future requirements is approximately 6,500. This total is for all types of parking including staff, car rental, and short stay. A further 500 spaces are likely to be lost by the proposed future redevelopment at Northside unrelated to car parking, giving a predicted shortfall in parking of approximately 7,000 spaces in 2015

The car parking structure options set out for Northside and Silver Zone in later sections are based on planning to provide facilities for this 21,150 total and reflect the predicted shortfall, estimated as 7,000 spaces.

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7. Review of potential locations for future airport parking

7.1 Review criteria

7.1.1 Environmental and financial criteria

Sites and options have been appraised on the basis of environmental criteria before consideration is given to their financial performance. However financial considerations are a determining factor for BIA in the delivery of the final strategy. Supporting Calculations for this assessment have been undertaken by BIA on the basis of standard project investment criteria, including the need to achieve a positive net value at a discount rate of 15%.

Reference was made to environmental criteria used in the BIA environmental scoping study and the sustainability appraisal. This review takes these criteria and in the absence of quantitative information, uses a qualitative approach to compare the options and locations using a summary red; amber and green scoring. This colour coding is used to indicate the relative differences in effects, with green signifying a benign or neutral effect; amber a minor negative effect and red negative effects. A detailed quantitative approach will follow in the EIA and TA studies for the options to be taken forward.

7.1.2 Weighting of factors

It is proposed that the majority of identified factors will not be weighted, with all matters given equal importance. Professional judgement was used to consider all issues, with the advantages and constraints of the various options being balanced up.

However specific issues were given particular consideration in the review. For example, if the site was found to have a potential to impact on aircraft safety due its location, or had been refused planning permission or was the subject of enforcement action, then these factors were deemed to be sufficient to justify why consideration of the site in question was not taken further.

7.2 Sites and options within existing BIA boundary, within proposed Green Belt inset

In his report on the Replacement Local Plan, the Inspector recommended that the northern part of BIA should be excluded from the Green Belt. The Council in their proposed modifications to the plan have supported these conclusions. Development within this inset is therefore considered to be appropriate.

The first priority location for scrutiny within the options hierarchy was land within the existing BIA boundary that falls in the proposed Green Belt inset. This is the existing Northside terminal, apron and car parking area.

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The starting point for the options review was therefore to seek to maximise the amount of car parking development within this inset, subject to normal development constraints such as visual effects. This options review drew the evaluations already carried out, for example the wireframe modelling results from the Options Appraisal Report. A range of parking options were explored, such as multi-storey, low level decking, surface parking and /or block-parking. Options were also explored to identify whether there was potential to relocate existing staff and car rental to enable more efficient use to be made of the Northside area for passenger car parking.

To maximise passenger parking provision on the Northside it could be possible to relocate all staff car parking and car rental parking to Silver Zone on the south side of BIA. This would allow the more intensive use of the available land on the Northside. This assumption has been incorporated into the evaluation of the following car park options for Northside. In discussion with Arups (who have provided input on the technical highway and design issues) three realistic options have been identified for Northside based on original design outlines from Reid Architects.

The 3 options outlined below are based on the previous visual assessment modelling and qualitative appraisal of other environmental aspects such as noise, air quality and cultural heritage. This evaluation indicated that further intensification, incorporating higher multi-storey options or with more coverage over Northside could have more intrusive visual effects and would not provide air or noise improvements, but would rather worsen the current baseline situation.

The three options for Northside car parking are:

Option A

This comprises a single multi-storey car park, with four above ground levels and a basement, located in the vicinity of the terminal, plus an area of two storey decked car parking, adjacent to the multi-storey. The remaining Northside area would be surface parking.

Option B

This option proposes two multi-storey car parks (same design as Option A) located to the north of the terminal building, and decked parking in the north west corner. The remaining area would be surface parking.

Option C

This option proposes two multi-storey car parks (same design as Option A and B) located to the north of the terminal building. With the exception of the north east corner of the site, all of the remaining area would be decked.

The three options and the parking they can deliver is summarised in Table 7.1 and illustrated in Figures 7.1-7.3.

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Table 7.1 Northside future car parking options

	Northside option A	Northside option B	Northside option C
Multi-storey parking	1,180 spaces	2,360 spaces	2,360 spaces
Deck parking	1,096 spaces	1,157 spaces	4,383 spaces
Other surface parking	3,010 spaces	2,504 spaces	860
Total	**5,286 spaces**	**6,021 spaces**	**7,603 spaces**

Opportunities and constraints relating to these options are shown in Table 7.2. The qualitative approach uses a summary red, amber and green scoring. This colour coding is used to indicate the relative differences in effects, with green signifying a benign or neutral effect; amber, a minor negative effect; and red, a significant negative effect.

Table 7.2 Northside options: opportunities and constraints

Constraint/opportunity	Option A	Option B	Option C
Local Plan zoning	Forest of Avon	Forest of Avon	Forest of Avon
Flood risk	Low <1 in 1000	Low <1 in 1000	Low <1 in 1000
Landscape designation	Priority Landscape Improvement Area	Priority Landscape Improvement Area	Priority Landscape Improvement Area
Green Belt	In Green Belt but possible exclusion	In Green Belt but possible exclusion	In Green Belt but possible exclusion
Visibility	Views from North, particularly from higher elevations. Multi-storey should be located to the South of site to minimise views from residential properties on Downside Road	Views from North, particularly from higher elevations. Multi-storeys should be located to the South of site to minimise views from residential properties on Downside Road	Views from North, particularly from higher elevations. Multi-storey should be located to the South of site to minimise views from residential on Downside Road. Extensive decking could dominate some views from Downside Road
Green roof environmental opportunities	Limited amenity and ecological opportunity	Limited amenity and ecological opportunity	Greatest amenity and ecological opportunity
Access route to BIA	Adjacent to BIA terminal	Adjacent to BIA terminal	Adjacent to BIA terminal
Distance to BIA (straight line)	0	0	0
Distance to major roads	Adjacent to A38	Adjacent to A38	Adjacent to A38
Economic/operational viability	Lower construction cost. Locating multi-storey and decking adjacent to terminal allows premium parking service to offset initial and ongoing costs	Higher construction cost. Locating multi-storeys and decking adjacent to terminal allows premium parking service to offset initial and ongoing costs	Highest construction cost. Long walk for passengers if parking in decking furthest from terminal. Longer to offset initial and ongoing costs and likely to be more expensive than

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Constraint/opportunity	Option A	Option B	Option C
			unauthorised parking sites in vicinity of BIA
Size (ha)	15.1	15.1	15.1
Total spaces	5,286 spaces	6,021 spaces	7,603 spaces
Summary scoring			

Preferred option

Option C maximises the provision of additional car parking within the Green Belt inset which is a key initial aim of the study. A greater use of multi-storey car parking in this location cannot easily be sympathetically achieved given the landform and surrounding visual receptors. Therefore, even with the use of significant areas of decked parking the Green Belt inset area of Northside cannot accommodate more than approximately 7,600 self-parking spaces.

The inclusion of a large proportion of decked parking does provide opportunities via selected roofing of the most sensitive sections to reduce noise, lighting and visual issues present in the existing parking arrangements. Green roofing of these decked surfaces could also attenuate surface water runoff (providing a source for rainwater harvesting and re-use) and provide potential for amenity and ecological enhancements.

Option C is considered to be the preferred option for the inset land at Northside to be taken forward for more detailed evaluation within the EIA and TA and incorporated within the final Master Plan. It provides approximately 7,600 car parking spaces. Therefore, given the total predicted requirement is in the order of 21,150, the residual number of spaces still to be accommodated elsewhere is approximately 13,550.

7.3 Sites and options within BIA boundary, within Green Belt

As it is not possible to accommodate all of the required car parking spaces within the Green Belt inset, the next step was to seek to provide additional car parking elsewhere within BIA's operational boundary. This includes the existing Silver Zone block-parking facility.

Although this would be within the Green Belt, such development is deemed to be Permitted Development, if associated with operational requirements. If this land was required, BIA would aim to maximise the use of existing operational land, within the Green Belt, subject to not conflicting with the operational requirements of the airport. A range of parking options will be explored, such as multi-storey, low-level decking, surface parking as well as balancing the use of self-parking and block-parking.

7.3.1 Overview

Even with an intensification of car parking on the northern side of the airport, there remains a need to provide additional land for car parking. Using the sequential hierarchy approach established earlier in this assessment, the next option is to assess other operational land that is within the BIA boundary but that is also within the Green Belt. However it is considered that

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the development of car parking on this land would be Permitted Development, and therefore is not inappropriate development and would not require exceptional circumstances to justify it.

The area examined comprises all land to the south of the existing runway, and includes land at either end of the runway, and up to the line of the re-routed A38. It also includes the existing Silver Zone and Silver Zone overflow car parks.

Key considerations within this area relate to the need to avoid conflict with airport operations and existing infrastructure and communication equipment. Environmental considerations include visual intrusion effects, together with ecological and cultural heritage aspects.

7.3.2 East and west of runway

There is undeveloped land at either end of the runway. However, locating car parking in these locations would interfere with the safe landing and take off of aircraft, and is therefore not considered to be a suitable option.

7.3.3 Land to the south of runway

This land lies to the south of the runway, and to the west of the existing Silver Zone. This part of the site is currently used as a fire training area and it is proposed to relocate the fire station to this part of the airport in the Master Plan. It is therefore considered that this is not a suitable location for car parking.

7.3.4 Silver Zone

Maximising passenger parking at Northside as outlined in Section 7.2 will require moving parking for staff and car hire to Silver Zone. This will require Silver Zone to accommodate 1,050 self-parking spaces for staff and 650 for car rental. Together with the required access roads this will result in a total capacity of between 6,000 and 6,500 cars within the existing Silver Zone car park boundary. Table 7.3 sets out how this reconfiguration impacts on the total number of spaces that can be accommodated in Silver Zone.

Table 7.3 Reconfigured Silver Zone - future car park spaces

Product	Silver Zone
Surface self-parking	1,700 (1050* staff and 650 car hire)
Surface block-parking	7,100 spaces
Total	**8,800 spaces**

* Assuming 150 staff spaces will be provided Northside.

Increasing the number of car parking spaces in Silver Zone by decking or multi-storey car parking would be difficult to justify on economic grounds as the construction costs involved would require the car park to be charged at a premium. BIA's experience, and that of other airports, suggests that premium parking is only viable if customers can then walk to the terminal, something that is not practicable from Silver Zone. There is also a concern regarding the visual intrusion of multi-storey parking on the A38 and surrounding areas. This was

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considered as part of the option appraisal study that fed into the draft Master Plan and concluded that such development would result in landscape and visual effects.

7.3.5 Preferred option

Operational land that is within BIA boundary but that is also within the Green Belt has been reviewed and there is little scope to increase the car parking provision in this area. Indeed by reallocating staff and hire car spaces from Northside the number of passenger car parking spaces that can be provided within the Silver Zone is reduced to approximately 7,100 spaces. However this reconfiguration is logical, as it concentrates passenger parking next to the terminal. This allows intensification of the car parking on Northside, including the use of multi-storey car parking where visual intrusion effects are less pronounced

No multi-storey or decked parking is proposed at present within Silver Zone. The multi-storey options are costly and may have negative visual intrusion effects. Decked parking is likely to have reduced visual effect that may be mitigated via screening, but further detailed evaluation is required for a full assessment to determine this. At present decked parking to the south of the runway is ruled out on economic grounds.

Therefore, given the proposed reconfiguration of the Northside car parking the net contribution Silver Zone can make is 8,800 parking spaces. Given the total predicted requirement is in the order of 21,150 and that Option C provides approximately 7,600 car parking spaces, the residual number of spaces still to be accommodated elsewhere is approximately 4,750.

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8. Residual car parking requirements and solutions

8.1 Off site options for residual parking requirements

The options outlined in Section 7, within the Green Belt inset and other operational areas of BIA, while they do not necessarily constitute every possible permutation, do show a maximum number for car parking capacity within BIA's boundaries. The car parking spaces that can be created within BIA's current operational land boundary is in the order of 14,900 spaces. With a minimum of 21,150 spaces needed to meet demands of 9mppa, a further 4,750 car parking spaces will be required that cannot be accommodated within BIA's current boundary, even with significant intensification of Northside. Taking into account likely parking pattern, utilisation and access this is estimated to require between 8.5 - 11.9ha of land.

8.2 Strategic locations remote to BIA

Therefore, the next option in the sequential hierarchy is to assess potential locations for strategic car parks. These have been considered previously within the ASAS and the draft Master Plan as options to reduce surface traffic. These facilities were identified as long-term park and ride sites, located at strategic points on the surrounding highway and rail network. Potential locations were also identified in the ASAS and these are outlined in the draft Master Plan. The intention would be that the park and ride facilities would intercept car journeys and also encourage more use of rail. Passengers would then be conveyed to and from the final stage in their journey to BIA by dedicated bus services from the strategic sites.

Overview

Eight potential areas are identified in the ASAS, which have some potential as strategic long stay park and ride car parks for BIA, were evaluated in this study in terms of their economic/operational viability and environmental constraints and opportunities (see Figure 8.1). The development of remote park and ride locations require good road access to attract and shorten passenger and staff journeys. Potential locations looked at were therefore along the M5 corridor and along the southern edge of Bristol. The latter could take advantage of a southern ring road, as identified in GBSTS, if constructed in the future.

A further consideration was linking prospective sites with the strategic rail network to encourage multi-model journeys on public transport. This approach would work in parallel to the improved Flyer service from Bristol Temple Meads. In identifying potential suitable locations reference was made to policies and proposals in the Regional Spatial Strategy, emerging Local Polices for North Somerset and surrounding authorities and the Greater Bristol Transport Study. Potential sites are shown in Table 8.1 and on Figure 8.1.

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Table 8.1 Potential strategic park and ride locations

Location number	Name of strategic park & ride search area	National Grid reference centre point
S1	Worle	ST 365 625
S2	M5 Junction 21	ST 378 623
S3	Avonmouth South	ST 506 757
S4	Avonmouth North	ST 530 786
S5	Ashton Vale North	ST 559 709
S6	Ashton Vale South	ST 557 689
S7	Yew Tree Farm	ST 561 693
S8	Whitchurch	ST 617 671
S1	Worle	ST 365 625

These locations are between 7 and 14km from BIA and are compared in a qualitative evaluation that combined desk study environmental information (e.g. located in Green Belt or designated flood plain), together with economic and operational considerations. This evaluation is shown in detail in Appendix A and summarised in Tables 8.2 and 8.3, with descriptions in the following sections (8.2.1 and 8.2.2). The qualitative approach uses a summary red, amber and green scoring, with green signifying a benign or neutral effect; amber, a minor negative effect; and red, a significant negative effect.

8.2.1 M5 corridor locations

The M5 corridor locations (S1, S2 and S4) can be positioned to potentially avoid use of Green Belt land, although Avonmouth South (S3) cannot unless land north of the disused railway was available. There are few other insurmountable environmental constraints identified for the general locations along the M5 corridor, although there are local designations and landscape character effects to consider. Bus routes would however have to use rural roads, particularly from the two southern sites with the B3133 needing to be utilised. Any location to be taken forward would require appropriate surveys and quantitative assessment to ensure all relevant environmental considerations were taken into account.

In terms of operational viability all the locations are some distance (10km plus) from the airport making the bus journey fairly long and all would therefore have relatively high operating costs. Passenger numbers from the north of Bristol are larger than those from the south west and this favours a car park location near to Avonmouth (S3 or S4). However, none of the locations are free from operational issues that limit their viability, in particular land costs are likely to be high on all sites because of competing commercial and residential development. Locations are likely to be fairly expensive to develop and would ideally be partnered with park and ride sites for Bristol (S3 & S4) or Weston-super-Mare (S1 & S2).

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Table 8.2 Strategic park and ride locations qualitative evaluation summary: M5 Corridor

Constraint/opportunity	Worle	M5 Junction 21	Avonmouth South	Avonmouth North
Statutory & non-statutory designations				
Local Plan zoning				
Flood risk				
Landscape designation				
Green Belt				
Other				
Distance to BIA (straight line)				
Access route to BIA				
Distance to major roads				
Operational viability				
Size (ha)				
Summary				

8.2.2 Southern Bristol locations (S5-S8)

The series of southern Bristol locations are all directly adjacent to major roads and the locations are typically urban fringe or open space. All locations are covered by planning policy landscape designations and all are in Green Belt. This last consideration makes development in these locations perhaps less favoured than Green Belt development contiguous with the airport. This is because locating the car parking facilities away from the existing airport operational area spreads the extent of built up areas into urban fringe or rural settings on the southern edge of Bristol. Ashton Vale North (S5) would appear from the desk study to be least favoured from an environmental perspective with a number of Local Plan designations (e.g. Conservation Area) and has a higher flood risk than the other southern Bristol locations. Whitchurch would appear to be less constrained than other southern Bristol locations from the desk study information. Any location to be taken forward would require appropriate surveys and quantitative assessment to ensure all relevant environmental considerations were taken into account.

The operational viability of the sites suggests that the Ashton Vale South and Yew Tree Farm locations are slightly more favoured than the other locations. This is because of their proximity to the A38 which is the key road access from Bristol to BIA. However, despite this advantage it is not clear that a park and ride facility in these locations would reduce car journeys, particularly in Bristol itself. An alternative approach put forward in the Public Transport Strategy would use increased numbers of bus routes and improved frequencies within Bristol to more effectively reduce traffic. These locations should be re-examined again in the future as part of the wider transport studies which would be associated with the southern ring road development and other infrastructure improvements in the area. If the southern Bristol ring road is built there may be significant traffic reduction benefits in a park and ride location that serves the city and the

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airport, but only if the facility attracts passengers from Bath and its environment and other passengers coming from the east of Bristol.

Table 8.3 Strategic park and ride locations qualitative evaluation summary: southern Bristol

Constraint/opportunity	Ashton Vale North	Ashton Vale South	Yew Tree Farm	Whitchurch
Statutory & non-statutory designations				
Local Plan zoning				
Flood risk				
Landscape designation				
Green Belt				
Other				
Distance to BIA (straight line)				
Access route to BIA				
Distance to major roads				
Operational viability				
Size (ha)				
Summary				

8.2.3 Remote locations summary

This review has concluded that there is currently limited potential for remote locations for park and ride facilities to the airport. Some locations considered within the draft Master Plan are at least partially environmentally constrained, in particular all the southern Bristol locations are in the designated Green Belt. Providing any location to be taken forward is subject to appropriate surveys and quantitative assessment, and a suitably sensitive development approach is adopted, environmental constraints may not limit the provision of these facilities. This approach would have to include the appropriate avoidance of negative environmental effects, together with a suitable mitigation/enhancement strategy to ensure all relevant environmental considerations are fully taken into account. The current planning context, though, favours sites not within Green Belt.

The rural nature of the local road transport network and the dispersed nature of the passenger catchment means that the operational viability of these locations is marginal. The M5 corridor locations are not considered to be viable as stand-alone facilities given the distance from BIA and also the high land prices due to the development potential of the locations. In partnership with other park and ride development, their viability may be improved. All of these remote locations should be kept under review as the GBSTS evolves and is implemented but are currently considered not to be viable.

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8.3 Sites contiguous with BIA's boundary, within Green Belt

Given the remaining residual need for car parking and the current unviable nature of the strategic locations remote from BIA, the final element of the sequential analysis is to consider sites contiguous with BIA's operational boundary. These potential sites are also in the Green Belt and development is therefore likely to be considered to be inappropriate and requires exceptional circumstances to justify it.

Sites directly contiguous with the current boundary of BIA were selected on the basis of environmental constraints, suitable land access to the A38 and accessibility to the airport infrastructure together with other operational aspects (see Table 8.4). A series of five sites (see Figure 8.2) were identified and the qualitative evaluation is summarised in Table 8.4 with further information in Appendix B. There is one exception, Lulsgate Quarry (Site 5) is not directly contiguous with the BIA operational boundary, but is approximately 500m to the northeast. This site is included because it is individually identified as a potential car park location in the draft Master Plan.

Table 8.4 Sites contiguous with BIA - constraints and opportunities

Constraint/ opportunity	Site 1 Cooks Farm	Site 2 Cornerpool and Cogloop	Site 3	Site 4	Site 5 Lulsgate Quarry
Statutory & non-statutory designations					
Local Plan zoning					
Flood risk					
Landscape designation					
Visibility					
Green Belt					
Other					
Distance to BIA (straight line)					
Access route to BIA					
Distance to major roads					
Operational viability					
Size (ha)					
Summary					

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8.3.1 Evaluation of contiguous site options

Landscape and visual effects are considered to be key issue in and around the BIA boundary, and the two factors associated with this are the sites visibility and landscape designation. Sites 3 and 4 are considered to be highly visible to the surrounding higher ground and also the A38. Screening cannot fully remove these potential effects because of the local topography. Site 2 and 5 are both well screened.

Part of Site 5 (Lulsgate Quarry) is designated a Site of Special Scientific Interest (SSSI) and a Site of Nature Conservation Importance (SNCI). These are likely to restrict the use of the site as a car parking facility. Site 4 is adjacent to a Scheduled Ancient Monument (SAM) and an SNCI, but this is considered to be less of a constraint.

Other environmental considerations identified in the study include land use and ecology. Site 5 is a former quarry now used for landfill which, depending on its conditions for restoration, may be considered as a brownfield site. The other sites are greenfield agricultural land graded from poor (Site 2) to moderate/good. There is other ecological and archaeological interest associated with these sites which would need to be considered further as part of an EIA.

A key practical consideration is that for self-parking a site of up to 11.9ha is required to meet the residual requirement identified in this report. Both Site 3 and 5 are too small to accommodate self-parking (sizes are 7ha and 6ha respectively) and would not be able to accommodate all the residual requirement even as block-parking. In addition there would be no land available for visual screening or ecological mitigation.

The balance of environmental and operational viability considerations used in the qualitative assessment indicate that the preferred option to be taken forward into the Master Plan, EIA and TA process is Site 2 (Cornerpool and Cogloop). This site is well screened and is large, offering more space to build in the appropriate level of landscaping, ecological and cultural heritage mitigation and enhancements. The adopted solution is considered in more depth in Section 9.

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9. Adopted solution

9.1 Strategy prerequisites

The implementation of the Public Transport Strategy and the staff Travel Plan are recognised as key first steps in facilitating the delivery of the adopted solution. This includes the 13% target for public transport use identified in the draft Master Plan. The potential development of new road infrastructure and improved bus priority measures through the Joint Local Transport Plan will assist with its achievement. The adjusted modal split that will arise from the strategy is summarised in table 9.1.

Table 9.1 Future modal split for passenger journeys to BIA

Journey mode	Proportion of passengers	
	2005 (4.6mppa)	**2015 (9mppa)**
Bristol International Flyer	5%	**9%**
Public bus	Included above	**4%**
Other bus	2%	1%
Car dropped off	36%	32%
Short stay car park	2%	2%
Long stay car park	38%	35%
Hire car	5%	5%
Taxi	12%	12%

The use of strategic park and ride schemes would also potentially reduce car park demand at the BIA site. However, in this study it is concluded that the rural nature of the local road transport network and the dispersed nature of the passenger catchment means that the operational viability of these facilities is marginal. In partnership with other park and ride development, their viability may be improved. All of the remote locations should be kept under review as the GBSTS evolves and is implemented.

9.2 Northside intensification and Silver Zone reconfiguration

Provision of multi-storey car parking and decking over most of Northside (Option C – see Figure 7.3) is considered to be the preferred option for the inset land at Northside to be taken forward for more detailed evaluation within the EIA and TA and incorporated within the final

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Master Plan. This option maximises the provision of additional car parking within the Green Belt inset. A greater use of multi-storey car parking in this location cannot easily be sympathetically achieved given the landform and surrounding visual receptors. This option provides approximately 7,600 car parking spaces.

The inclusion of a proportion of decked parking does provide opportunities via selected roofing of the most sensitive sections to reduce noise, lighting and visual issues present in the existing parking arrangements. Green roofing of these decked surfaces would also attenuate surface water runoff (providing a source for rainwater harvesting and re-use) and provide potential for amenity and ecological enhancements. The adopted solution land use plan is shown in Figure 9.1 with an outline design for Northside shown in Figure 9.2.

Other operational land that is within BIA boundary but that is also within the Green Belt has been reviewed and there is little scope to increase the car parking provision in these areas. The intensification of the car parking on Northside includes the reallocating of staff and hire car spaces to the Silver Zone. The implication of this is to reduce capacity to 7,100 spaces given that no multi-storey or decked parking is proposed at present within Silver Zone.

Therefore, given the total predicted requirement for car parking is in the order of 21,150 spaces and that Northside and Silver Zone together will provide 16,400 spaces, the residual number of spaces still to be accommodated elsewhere is approximately 4,750.

9.3 Site 2: Cornerpool and Cogloop

Consideration has being given to a number of potential options for the expansion of the Silver Zone car park onto Cornerpool Farm in the past (see EIA scoping Study; Entec 2005). The selection of this site through this sequential study supports this initial optioneering and provides a qualitative appraisal of the alternatives. The scoping study identified a series of potential environmental effects summarised in Table 9.2. The site is relatively large (27ha) compared to the land requirement to support the future car parking needs (8.5 - 11.9ha). Therefore, the initial review undertaken of these potential effects would suggest that there is ample opportunity to mitigate potential effects and also provide space for additional enhancements. The development of further surface car parking at Silver Zone would be approached on a sequential basis with the minimum amount of land take required as set out in the Master Plan. In the first instance the Master Plan sets out that Silver Zone will be expanded by approximately 2.5ha. While this will not be sufficient for an expansion of BIA to 9mppa it should allow sufficient long stay parking spaces for passengers until 2011 (based on current estimates). Expansion of Silver Zone car parking beyond this extent should be reassessed based on passenger growth and future car parking requirements.

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Table 9.2 Summary of the potential effects identified in the scoping report (Entec 2005)

Topic	Potential effect	Next steps
Archaeology and Cultural Heritage	Loss of remains of early post Medieval lead extraction to SE of Cornerpool Farm, known as 'Gruffy Ground'.	Desk study and consultation.
Biodiversity	Disturbance/loss of bat foraging habitat and/or modification of commuting routes (including disturbance from security lighting), and severance of commuting routes.	Bat surveys (roost inspections, and activity surveys) will be undertaken based on guidance provided by English Nature and the Joint Nature Conservation Committee.
	Permanent land take causing death or injury, and disturbance, or loss of great crested newt resting or foraging-habitat and commuting routes.	Surveys will be undertaken in accordance with guidance from English Nature.
	Damage and/or disturbance to badger setts, and potential for sett destruction, loss of some foraging habitat, and/or access to some foraging habitat.	Surveys will be undertaken in accordance with guidance from English Nature.
	Damage or disturbance to individual reptiles and/or their resting places, and/or loss of foraging and resting habitat.	Surveys will be undertaken in accordance with guidance from English Nature and the Joint Nature Conservation Committee.
	Damage or disturbance to dormouse hedgerow habitat and potential for injury to dormouse.	Surveys will be undertaken in accordance with guidance from English Nature and the Mammal Society.
Landscape	Loss of mature vegetation and changes in ground levels associated with the construction of additional car parking within Cornerpool Farm.	Assessment based on methods promoted by the Second Edition of the Guidelines for Landscape and Visual Impact Assessment produced by the Landscape Institute and Institute of Environmental Management and Assessment (2002).
	Changes to the wider landscape character as a result of construction activity.	Assessment based on methods promoted by the Second Edition of the Guidelines for Landscape and Visual Impact Assessment.
	Effects on retained landscape features in the vicinity of Cornerpool Farm during the operation of an extended silver zone car park.	Assessment based on methods promoted by the Second Edition of the Guidelines for Landscape and Visual Impact Assessment
	Long term changes to landscape character by reconfiguration of features and elements outside the existing site boundary.	Assessment based on methods promoted by the Second Edition of the Guidelines for Landscape and Visual Impact Assessment
Visual	Visibility of the construction activities and infrastructures from various receptors.	Assessment based on methods promoted by the Second Edition of the Guidelines for Landscape and Visual Impact Assessment.
	Visibility of the new terminal, fuel farm, new aircraft stands, short stay car park and airport hotel, and the proposed car park extension into the Cornerpool Farm area (various options), associated infrastructure and lighting.	Assessment based on methods promoted by the Second Edition of the Guidelines for Landscape and Visual Impact Assessment.
	Effects of increased lighting during construction and operation.	Assessment based on methods promoted by the Second Edition of the Guidelines for Landscape and Visual Impact Assessment.

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Similar potential effects are also considered to be associated with the alternative contiguous sites so this does not affect the selection of the adopted solution. Indeed the large size of Site 2 provides more scope for mitigation and enhancement, as noted above. These potential landscape, visual, ecological and archaeological effects associated with this site will need to be considered in more detail in the further assessment required as part of the EIA.

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Appendix A
Environmental Appraisal Matrix - Strategic Locations

Table A.1: Strategic park and ride locations - evaluation of environmental and operational viability criteria

Constraint/opportunity	S1 Worle	S2 M5 Junction 21	S3 Avonmouth South	S4 Avonmouth North	S5 Ashton Vale North	S6 Ashton Vale South	S7 Yewtree Farm	S8 Whitchurch
Statutory & non-statutory designations	Small proportion SNCI	Small proportion SNCI	Small proportion SNCI	Wildlife Network Site, SAM to far south of area	SNCI, Wildlife Network Site, Registered Historic Park and Garden	SNCI, Wildlife Network Site	SNCI, Wildlife Network Site	None
Local Plan zoning	Employment, residential, hotel & retail development, park and ride	Employment, hotel & retail development,	Employment development, Forest of Avon, Priority Wildlife Conservation Area. 500 space park and ride site to North of junction. Protected site for railway station	Retail, existing industrial and warehousing	Conservation Areas, SAM, Open Space, existing industrial and warehousing	Forest of Avon, existing office use, Open Space, Prominent Green Hillside, Community Services and Open Space	Forest of Avon, existing office use, Open Space, Prominent Green Hillside, Community Services and Open Space	Recreational, housing, small park and ride site

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Constraint/opportunity	S1 Worle	S2 M5 Junction 21	S3 Avonmouth South	S4 Avonmouth North	S5 Ashton Vale North	S6 Ashton Vale South	S7 Yewtree Farm	S8 Whitchurch
Flood risk	Medium - High 1 in 1000 - 100	Medium - High 1 in 1000 - 100	North of M5 Predominantly Medium - High 1 in 1000 - 200 South of M5 Low <1 in 1000	High 1 in 100 for most of site Low <1 in 1000 to East of junction	High 1 in 100 to South of Long Ashton park and ride Low <1 in 1000 elsewhere	Low <1 in 1000	Low <1 in 1000	Low <1 in 1000
Green Belt	No	No	Yes - area S & E of disused railway line No - area N of disused railway line	No	Yes	Predominantly	Predominantly	Yes
Landscape designation	Small proportion Landscape Buffer Zone	Landscape Buffer Zone to West of M5	Land S of disused railway predominantly Priority Landscape Improvement, Historic or Wildlife Conservation Areas	Historic Landscape to South	Priority Landscape Conservation Area	Major tree planting scheme, Priority Landscape Improvement Area	Major tree planting scheme, Priority Landscape Improvement Area	Landscape Character Area 5

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Constraint/opportunity	S1 Worle	S2 M5 Junction 21	S3 Avonmouth South	S4 Avonmouth North	S5 Ashton Vale North	S6 Ashton Vale South	S7 Yewtree Farm	S8 Whitchurch
Other	North Somerset LGA. Predominantly urban and development land. Apple Farm train station on site	North Somerset LGA. Predominantly urban to West of M5, moderate to good agricultural land to East	North Somerset LGA. Employment land to North, otherwise agricultural with residential to E (Easton-in Gordano). Site adjacent to disused Portishead to Bristol railway line which has been safeguarded for future reopening (in the long term)	North Somerset LGA. Primarily existing industrial and warehouse usage with residential to South West	Within Bristol City and North Somerset LGAs. Urban fringe between Bristol and Long Ashton next to existing Bristol park and ride car park	Within Bristol City and North Somerset LGAs. On urban fringe of Bristol with residential to East	Within Bristol City and North Somerset LGAs. On urban fringe of Bristol with residential to S, E and N, cemetery immediately to NE. Steeply sloping area to N and W of Yewtree farm	Bath & NE Somerset LGA. Residential to N, agricultural to S
Distance to BIA (straight line)	12km	11km	10km	12km	7km	6km	7km	11km
Distance to major roads	1 km from M5 Junction 21 and A370	Adjacent to M5 Junction 21 and A370	Adjacent to M5 Junction 19 and A369	Adjacent to M5 Junction 18 and A4	Adjacent to A370	Adjacent to A38	Adjacent to A38	Adjacent to A37
Access route to BIA	A370/B3133/A38	A370/B3133/A38	A369/A4/A38	A4/A38	A370/A4/A38. Possible direct link road to A38 in future	A38	A38	A37/B3130/A38

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Constraint/opportunity	S1 Worle	S2 M5 Junction 21	S3 Avonmouth South	S4 Avonmouth North	S5 Ashton Vale North	S6 Ashton Vale South	S7 Yewtree Farm	S8 Whitchurch
Operational viability	No land available for BIA park and ride except areas zoned for development and earmarked park and ride sites. Would not serve passengers from Bristol	Agricultural land available. Distance from airport makes for high operating costs. Would not serve passengers from Bristol	Potentially viable if incorporated with earmarked park and ride site for Bristol though a far larger site than zoned would be necessary area would be needed. Would not serve passengers from Bristol	Land potentially expensive. Distance from airport makes for high operating costs. Would not serve passengers from Bristol	Closer to BIA. Potential link road to A38 to be constructed. Could serve Bristol passengers	Closer to BIA. Could serve Bristol passengers	Closer to BIA. Could serve Bristol passengers	Would not service majority of Bristol or Bath area
Size (ha)	Park and ride zoning is approx 3ha	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Operational limitations	Limited by existing development and zoning	Some limitations from existing development and zoning	Not limited by existing development	Limited by existing development	Not limited by existing development	Limited by topography	Limited by topography and existing uses.	Not limited by existing development.

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Appendix B
Environmental Appraisal Matrix - Contiguous Sites

Table B.1 Sites contiguous with BIA - constraints and opportunities

Constraint/ opportunity	Site 1 Cooks Farm	Site 2 Cornerpool and Cogloop	Site 3	Site 4	Site 5 Lulsgate Quarry
Statutory & non-statutory designations				Adjacent to SAM. Adjacent to SNCI	Lulsgate quarry SSSI, SNCI
Local Plan zoning	Forest of Avon	Forest of Avon	Forest of Avon	Forest of Avon	Forest of Avon
Flood risk	Low <1 in 1000	Low <1 in 1000	Low <1 in 1000	Low <1 in 1000	Low <1 in 1000
Landscape designation	Priority Landscape Improvement Area	Partially within Priority Landscape Improvement Area	Priority Landscape Improvement Area	Partially within Priority Landscape Improvement Area	Priority Landscape Improvement Area
Visibility	Relatively well hidden from roads (A38 and Downside Rd) but locally prominent to dwellings to the North. Further screening possible though it will not be possible to completely screen views from the North	Well screened from A38 and residential areas. Further screening possible	Highly visible from Felton Common and A38. Difficult to screen effectively because of topography	Highly visible from Felton Common. Difficult to screen effectively because of topography	Screened from roads and residential areas
Green Belt	Yes	Yes	Yes	Yes	Yes
Other	Predominantly moderate-good agricultural land. Farmer lives on site and is unwilling to sell. Residential dwellings close by. Within groundwater source outer protection zone. Bats. Slopes down from S to N	Poor agricultural land. Within groundwater source outer protection zone. Bats. Badgers. Slopes down from N to S. RAF Heritage. Owned by BIA.	Predominantly moderate-good agricultural land. Reptiles. Relatively level site on high ground	Predominantly moderate-good agricultural land. Relatively level site on high ground	Brownfield site (former quarry now used for landfill)
Distance to BIA (straight line)	Adjacent	Adjacent	Adjacent	Adjacent	0.5km

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Constraint/ opportunity	Site 1 Cooks Farm	Site 2 Cornerpool and Cogloop	Site 3	Site 4	Site 5 Lulsgate Quarry
Access route to BIA	Northside car park	Silver Zone car park	A38	A38	A38
Distance to major roads	1km to A38	Adjacent to A38	Adjacent to A38	Adjacent to A38	Adjacent to A38
Operational viability	Contiguous with Northside car park. Can be incorporated into existing Northside car parking services. Low operating costs	Contiguous with Silver Zone car park. Can be incorporated into existing Silver Zone car parking services. Low operating costs	Potential to incorporate into existing Silver Zone or Northside car parks. Located to BIA side of A38. Potential expansion of BIA runway or aircraft aprons may reduce viability. Low operating costs	Location on opposite side of A38 to BIA may have adverse traffic implications. Low operating costs	Location on opposite side of A38 and not contiguous with BIA may have adverse traffic implications. Low operating costs
Size (ha)	19	27	7	24	6
Indicative nos of spaces (surface self-parking)	7,600	9,600	2,500	8,600	2,100
Summary					

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