

**G ENVIRONMENTAL ASSESSMENT**

South Stirling Park & Ride  
Stirling Council and Tactran  
STAG Report



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STAG Report



# South Stirling Park & Ride STAG Study

## **Part 2 Environmental Report and Extended Phase 1 Habitat Survey Report**

FINAL REPORT

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# 1 Introduction

## 1.1 Project Background

SIAS Ltd in association with Scotland Transerv has been appointed by Stirling Council and Tactran to investigate the feasibility of a new park and ride site to the south of Stirling. The new park and ride would complement the two existing park and ride sites serving Stirling and potentially provide more of a Strategic interchange facility for trips to Edinburgh and Glasgow.

The purpose of the feasibility study is to establish the appropriate location of a site and to provide a supporting business case.

The study is being undertaken in accordance with the key processes describes in Scottish Transport Appraisal Guidance (STAG). STAG defines a staged approach to the assessment of transport plans or strategies: Pre-Appraisal, Part 1 Initial Appraisal and Part 2 Detailed Appraisal. Pre-Appraisal and Initial Appraisal have already been carried out and reported separately, and these included information on environmental conditions within the study area (Pre-Appraisal) and then specific constraints associated with the eight potential sites identified for Initial Appraisal.

This report provides a Part 2 Environmental Appraisal of the three alternative Park and Ride (P&R) sites that would put forward for more detailed assessment at the conclusion of the Initial Appraisal process.

## 1.2 Purpose of the Report

The purpose of this report is to:

- present the existing baseline environmental conditions associated with the three P&R sites (focusing on the STAG environmental sub-criteria topics);
- identify the potential for impact on the environment (STAG environmental sub-criteria topics) as a result of development of any of the sites;
- assess the overall level of impact significance that a P&R facility might have at the three locations; and
- provide recommendations for key environmental aspects that would need to be considered further should a P&R scheme be progressed.

## 2 Methodology

### 2.1 Collation of Baseline Information

Existing information on the current baseline environmental conditions within the area to the south of Stirling has already been gathered through the STAG Pre-appraisal and Initial Appraisal processes. During the Part 2 appraisal process this information has been updated where appropriate through additional desk study, consultation with statutory and non-statutory consultees and field survey.

Relevant information and issues raised through the consultation process carried out during February and March 2010 have been taken into consideration as part of the assessment.

### 2.2 Environmental Evaluation

A strategic level environmental assessment of the three alternative P&R sites has been undertaken following the general requirements of the STAG Part 2 appraisal. Relevant sections of the Part 2 AST have also been completed for each P&R site with supporting background environmental information referenced as necessary.

Environmental impact significance criteria follow that outlined in the STAG manual (Technical Database Section 7 Environment, April 2009), i.e. the seven point scale. STAG requires that the basis for the determining the level of impact significance should be clearly set out.

Determination of impact significance commonly involves the interaction of impact magnitude and receptor sensitivity. These criteria vary for each environmental topic and therefore Tables 1, 2 and 3 below provide definitions of receptor sensitivity to the type of development proposed, the magnitude of anticipated impact on these receptors and the overall combined significance of impact (as specified in the AST). It should be noted that these criteria are very much indicative based on a strategic, mainly qualitative assessment.

#### Noise and Air Quality

In terms of air quality and noise aspects, the Part 2 STAG appraisal aims to consider the general possible benefits and dis-benefits of a scheme; however it does not include the detailed quantification of air pollutant concentrations and noise levels, which generally take place later when assessing a scheme at a local project level.

Consequently although the receptor sensitivity for noise and air quality does vary between more sensitive receptors (i.e. hospitals, schools, nursing homes etc) and sensitive receptors (i.e. residential properties); the magnitude of impacts cannot be assessed for each of these receptors because at this stage only strategic information is available.

With regard to the evaluation of the impact significance for noise the seven point semantic scale has been used referenced against appropriate assessment values as taken from the DMRB HA213/08 Volume 11, Section 3, Part 7.

<b>Impact Descriptor (STAG Scheme)</b>	<b>Corresponding noise increases (DMRB HA213/08)</b>
Negative Major	> 5
Negative Moderate	3 to 4.9
Negative Minor	1 to 2.9
No Impact	0.9 to -0.9
Positive Minor	-1 to -2.9
Positive Moderate	-3 to -4.9
Positive Major	> -5

**Table 1 Descriptions of Receptor Sensitivity.**

Topic	Receptor Sensitivity			
	High	Medium	Low	Negligible/Neutral
<b>Water Quality, Drainage and Flood Defence</b>	Hydrological characteristics considered susceptible to relatively small changes and associated with sites of international or national biological importance and watercourses and waterbodies of a high water quality.	Hydrological characteristics considered reasonably tolerant of change associated with sites of local biological importance and watercourses and waterbodies of moderate water quality.	Watercourses and waterbodies of poor water quality considered potentially tolerant of moderate change.	Watercourses and waterbodies which suffer from pollution and/or are in a degraded condition considered tolerant of substantial change.
<b>Geology</b>	Nationally or internationally designated geological site and/or non-substitutable or highly sensitive geological attributes. Many small or some large areas of specific contamination. Important large scale potentially workable mineral reserves may be present.	Regionally or locally designated sites and/or of geological attributes with limited potential for substitution or moderate sensitivity. Several small or some large areas of less significant contamination, more easily removed/treated. Mineral reserves may be present, but unlikely to be of significant economic value.	Non-designated sites and/or of geological attributes easily substitutable or with low sensitivity. Potentially small areas of low-level contamination. Small isolated mineral reserves considered to be of no/low economic value.	Non-designated sites and/or geological attributes of no particular sensitivity. No known contamination present. No known mineral reserves.
<b>Biodiversity and Habitats</b>	Feature of international, national or regional nature conservation value, important for its rarity or habitat quality. Includes statutory protected sites, Ramsar Sites, Special Area of Conservation, Special Protection Area, Site of Special Scientific Interest. Highly sensitive as loss of, or significant impacts on, such a feature would be to the detriment of the European/national resource.	Feature of nature conservation value at up to a district or county context and may be designated as a non-statutory Site of Importance for Nature Conservation (SINC) or the equivalent. Loss of such a feature would have some nature conservation implications and should be avoided where possible.	Feature of local nature conservation value only, with insufficient value to merit a nature conservation designation. Value of such a feature is based on a degree of local rarity, and it may be widespread outside the local area. Loss would be unlikely to have nature conservation implications except at the local or site level.	Commonplace feature of little or no habitat/historical significance. Loss of such a feature not detrimental to the ecology of the area.
<b>Landscape</b>	Landscape or landscape elements of particular distinctive character, highly valued - national importance, or of particular importance locally with strong positive character and/or rarity and in particularly good condition. Considered susceptible to relatively small changes.	Undesignated but attractive landscape, element or feature in relatively good condition or of regional or particular importance locally. Considered reasonably tolerant of change	A landscape, element or feature with of low valued characteristics or negative character and in a poor or degraded condition. Considered potentially tolerant of substantial change.	A landscape of low valued characteristics considered tolerant of substantial change.

Topic	Receptor Sensitivity			
	High	Medium	Low	Negligible/Neutral
<b>Visual Amenity</b>	Where the landscape in the view is considered to be of high value and importance to the receptor and any change would be noticeable and would affect visual amenity, e.g. residential properties/footpaths.	Receptors where the landscape in the view is not perceived as a major element in the overall view and not crucial to their visual amenity, e.g. sporting/recreational facilities.	Receptors where the landscape in the view is unimportant and/or the users are not particularly sensitive to change, e.g. Industry/ places of work.	Receptors where the view has little or no impact, e.g. because of distance.
<b>Agriculture and Soils</b>	Agricultural land of Prime Quality, including Grade 1 to Grade 3.1. Presence of non-substitutable or highly sensitive soil attributes.	Agricultural land assessed to be of Grades 3.2 to 5.3. Presence of soil attributes with limited potential for substitution or moderate sensitivity.	Agricultural land assessed to be of Grades 6.1 to 6.3. Presence of soil attributes easily substitutable or with low sensitivity.	Land of no, or limited (Grade 7), agricultural value. Presence of poor quality soils which are easily substitutable.
<b>Cultural Heritage</b>	Sites of international or national importance including World Heritage Sites, Scheduled Monuments and Listed Buildings, Category A.	Sites of regional importance including Archaeological Sites of Regional Interest (ASRIs) and Listed Buildings, Category B.	Sites of local importance including Archaeological Sites of Local Interest (ASLIs) and Listed Buildings, Category C (S).	Sites that have been badly damaged or destroyed, or where their historic value is insufficient to justify their inclusion in a higher class.

**Table 2 Descriptions of Magnitude.**

Topic	Magnitude (positive or negative)			
	Major	Moderate	Minor	Neutral
<b>Water Quality, Drainage and Flood Defence</b>	Major shift away from baseline conditions, fundamental change to water quality condition either by a relatively high amount for a long-term period or by a very high amount for a short term episode. Major permanent or long term change to groundwater quality or available yield affecting resource use upon. Large reduction in flood plain capacity.	A significant shift from the baseline conditions that may be long-term or temporary. Changes to the local groundwater regime are predicted to impact slightly on resource use but not rule out any existing supplies. Moderate reduction in flood plain capacity.	Minor shift away from the baseline conditions. Changes in water quality are likely to be relatively small, or be of a minor temporary nature such that watercourse characteristics slightly affected. Changes to groundwater quality, levels or yields do not represent a risk to existing resource use. Small reduction in flood plain capacity.	No measurable change.
<b>Geology</b>	Partial (greater than 50%) or total alteration/disturbance of geological site/ attributes or disturbance such as to affect the value of the site. Likely to result in disturbance to contamination with risks to human health and/or the environment. Important mineral reserves may be significantly affected with loss in economic value.	Alteration/disturbance of part (between approximately 15% to 50%) of geological site/attributes such that the value of the site would be affected, but not to a major degree. Potential to result in disturbance to contamination with low level risks to human health and/or the environment. Small scale mineral reserves of some economic value may be affected.	Minimal effect on the geological site/attributes (up to 15%) or where there would be a minor disturbance such that the value of the site would not be affected. Low risk of disturbance to contamination with negligible risk to human health and/or the environment. Isolated mineral reserves may be affected but of no/low economic value.	No measurable change.
<b>Biodiversity and Habitats</b>	Major effects on the feature, which would have a sufficient impact to alter the nature of the resource and possibly affect its viability.	Effects detectable in short and long-term, but would not alter the viability of the system.	Minor effects, either of sufficiently small scale or of short duration to cause no long-term impact to the feature or the environmental resource.	No measurable change.
<b>Landscape</b>	The proposals are dominant in the landscape and fundamentally change its character and components.	The proposals are noticeable in the landscape, affecting its character and altering some of its components and features.	The changes are only a minor element in the overall landscape such that they are likely to be scarcely appreciated.	No measurable change.

Topic	Magnitude			
	Major	Moderate	Minor	Neutral
<b>Visual Amenity</b>	The proposals dominate the view from receptors and fundamentally change its character and components.	The proposals are noticeable in the view from receptors, affecting its character and altering some of its components and features.	The changes are only a minor element of the overall view from receptors that are likely to be missed by the casual observer and/or scarcely appreciated.	No measurable change.
<b>Agriculture and Soils</b>	A major loss or alteration of land use or where there would be complete severance of important parts of a site such as to significantly affect the post-development value of the site.	A loss, alteration or severance of land use such that the post-development value of a site would be diminished but to a minor degree.	Minimal loss, alteration or severance of land use such that there would be a measurable change but this would not significantly affect the use of land from pre-construction conditions.	No measurable change.
<b>Cultural Heritage</b>	Complete or partial demolition or loss (over 50%) of a site, or where there would be complete severance of important parts of a site such as to significantly affect the value of the site.	Loss of part (between approximately 15% and 50%) of a site, major severance, major effects on setting, or substantial increases in noise or disturbance such that the value of a site would be diminished but to a minor degree.	Minimal effect on a site (up to 15%) or a medium effect on its setting, or where there would be minor severance, increases in noise, vibration, disturbance or amenity such that there would be no effect on its value.	No measurable change.

**Table 3 Determination of Impact Significance.**

Receptor Sensitivity	Magnitude			
	Major	Moderate	Minor	Neutral
<b>High</b>	Major	Major	Moderate	Minor
<b>Medium</b>	Major	Moderate	Minor	No impact
<b>Low</b>	Moderate	Minor	Minor	No impact
<b>Negligible/ Neutral</b>	No impact	No impact	No impact	No impact

**Note: Impact significance can be positive or negative in accordance with STAG**

## 3 Environmental Appraisal

### 3.1 Noise and Vibration

#### Overview

For the three proposed P&R sites 1, 5A and 8 the average noise emissions associated with vehicle movements on main roads within the vicinity the sites have been calculated. This has been undertaken within the 3D noise prediction software NoiseMap Server Edition implementing the standard calculation methodology of the Technical Memorandum 'Calculation of Road Traffic Noise' 1988 (CRTN).

The calculations undertaken are based entirely on the traffic flow data for the surrounding main roads as provided by SIAS. This data was restricted to the M9, M80, A872, A91 and A9.

Within the scope of the assessment the following scenarios have been modelled with regard to the P&R:

- “Do minimum” – existing 2012 traffic flows with no contribution or provision of the P&R scheme; and
- “Do something” – 2012 flows with the inclusion traffic contributions from the P&R scheme under consideration.

The assessment was based upon the comparison of predicted “do minimum” and “do something” noise levels during the 2012 assessment year to quantify changes in average noise levels, numbers of people exposed and the change in population annoyed.

The approach of the STAG assessment is based upon the difference in the estimate population annoyed by noise between the “do minimum” and the “do something” scenarios. The methodology followed is outlined below:

1. “Do minimum” and “do something” noise contours have been plotted in 3dB(A) and 5dB(A) bandings;
2. Populations within these contours have been estimated based upon a population density factor of 2.4 residents per house;
3. For each contour in the “do minimum” and the “do something” the relevant annoyance response relationship has been concluded based upon the information contained within Table 7.1 of the STAG document;
4. The incremental impact of each option expressed as a difference in population annoyed has been derived by subtracting the population annoyed in the “do minimum” from that annoyed in the “do something” and summing this information over all of the noise contours.

### Site 1

Approximately 501 residential properties have been counted within 600m of the proposed site boundary based upon Ordnance Survey mapping data. Other sensitive receptors identified within the area were limited to Bannockburn Hospital 400m to the east and two churches located to the north at 460m and 600m respectively.

Based upon the results of the predictive noise modelling undertaken it has been demonstrated that changes in traffic volume, composition, speed and distribution on surrounding roads as a result of the PAR would account for an increase/decrease in noise in the region of 0.2dB(A) within the study area.

It is furthermore concluded that there will be no change in the population annoyed by noise as a result of the scheme proposal for PAR Site 1.

Based on the information supplied forming the basis of this assessment, PAR Site 1 is predicted to result in **No Impact** significance on the surrounding environment, in terms of Noise.

### Site 5A

Again using the Ordnance Survey mapping data it has been concluded that approximately 262 residential properties occur within 600m of the proposed site boundary. There were no other sensitive receptors identified within 600m of PAR Site 5a.

Based upon the results of the predictive noise modelling undertaken it has been demonstrated that changes in traffic volume, composition, speed and distribution on surrounding roads as a result of the PAR would account for an increase/decrease in noise in the region of 0.1dB(A) within the study area.

It is furthermore concluded that there will be no change in the population annoyed by noise as a result of the scheme proposal for PAR Site 5a.

Based on the information supplied forming the basis of this assessment, PAR Site 1 is predicted to result in **No Impact** significance on the surrounding environment, in terms of Noise.

### Site 8

Approximately 54 residential properties were concluded to be situated within 600m of the proposed site boundary of PAR Site 8. There were no other sensitive receptors identified within 600m of the site boundary.

Based upon the results of the predictive noise modelling undertaken it has been demonstrated that changes in traffic volume, composition, speed and distribution on surrounding roads as a result of the PAR would account for a maximum increase/decrease in noise in the region of 0.5dB(A) within the study area.

It is furthermore concluded that there will be no change in the population annoyed by noise as a result of the scheme proposal for PAR Site 5a.

Based on the information supplied forming the basis of this assessment, PAR Site 1 is predicted to result in **No Impact** significance on the surrounding environment, in terms of Noise.

### 3.2 Global Air Quality (Carbon Dioxide (CO<sub>2</sub>)) and Local Air Quality (Particulates (PM<sub>10</sub>))

#### Global Air Quality

##### Overview

Climate is strongly influenced by changes in the atmospheric concentrations of a number of gases that trap heat radiated from the earth's surface (the 'greenhouse effect'). Carbon dioxide (CO<sub>2</sub>) has been singled out as the most important transport induced greenhouse gas having a direct impact on global warming. Climate change is now widely recognized as a threat to the environment. In broad terms, the UK has committed itself to reduce emissions of key greenhouse gases by 12.5% from 1990 levels by 2010, though there are different targets for individual pollutants. CO<sub>2</sub> emissions are taken as a proxy in STAG for global air quality.

In addition, the Government Economic Strategy, published in November 2007, presents a set of national targets that aim at ensuring that the Government's purpose is met. Among them, two environment specific targets, promoting sustainability:

- i. To reduce emissions by 80 per cent by 2050; and
- ii. To reduce emissions over the period to 2011.

Following the Stern Review, the issue of CO<sub>2</sub> emissions has become significantly more prevalent and there are moves to monetize the impact of CO<sub>2</sub> emissions, in terms of the Shadow Price of Carbon (SPC). DEFRA have recently issued guidance on the monetization of greenhouse gases. This was adopted within the current STAG Appraisal.

The first stage is to calculate the Greenhouse Gas impact of the option being examined; total CO<sub>2</sub> emissions for road traffic were calculated according to the method in DMRB 11.3.1 (the unit of account used was t CO<sub>2</sub> rather than t C). The impact of a project on emissions was calculated for each year over the 60 year appraisal period<sup>1</sup>.

Indicators used include the change in:

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<sup>1</sup> Extrapolation between modeled years was required.

- i. CO<sub>2</sub> emissions (expressed in tons of CO<sub>2</sub> and tons of carbon equivalent t C);
- ii. The monetized present value of the change in CO<sub>2</sub> emissions.

#### Site 1

The likely carbon emissions impacts associated with Site 1 are of the order of 0.56% decrease in terms of total carbon emissions. This results in a slight benefit to society with the associated costs of CO<sub>2</sub> emissions decreasing from £47,919,914 (Discounted Monetised Value over 60 years without scheme) to £47,603,473 (Discounted Monetised Value over 60 years with scheme).

The net change in CO<sub>2</sub> with the proposed scheme in place has been calculated as -363 tonnes per year, which is considered to relate to a **Positive Minor** significance level.

#### Site 5A

The likely carbon emissions impacts associated with Site 5A are of the order of 0.56% decrease in terms of total carbon emissions. This results in a slight benefit to society with the associated costs of CO<sub>2</sub> emissions decreasing from £47,919,914 (Discounted Monetised Value over 60 years without scheme) to £47,651,603 (Discounted Monetised Value over 60 years with scheme).

The net change in CO<sub>2</sub> with the proposed scheme in place has been calculated as -308 tonnes per year, which is considered to relate to a **Positive Minor** significance level.

#### Site 8

The likely carbon emissions impacts associated with Site 8 are of the order of 0.56% decrease in terms of total carbon emissions. This results in a slight benefit to society with the associated costs of CO<sub>2</sub> emissions decreasing from £47,919,914 (Discounted Monetised Value over 60 years without scheme) to £47,651,603 (Discounted Monetised Value over 60 years with scheme).

The net change in CO<sub>2</sub> with the proposed scheme in place has been calculated as -308 tonnes per year, which is considered to relate to a **Positive Minor** significance level.

### **Local Air Quality**

#### Overview

The key pollutants to be considered in STAG are NO<sub>2</sub> and PM<sub>10</sub> (of primary concern in terms of health), which together are taken to account for local air quality. At the strategic level, spatially coarse transport models are unlikely to produce outputs suitable for estimating the exposure of properties to levels of air pollution. It is considered more appropriate to estimate the total emissions likely to be generated in the study area and to relate this to the magnitude of changes in emissions associated with the implementation of a scheme and where these changes occur.

Changes in total emissions can be used therefore as a surrogate or proxy for micro-scale air quality impacts. Generally reductions in total emissions in an area are likely to result in improved air quality, although to what extent will not be clear from an understanding of emissions alone and will be further investigated in the following stages of the appraisal.

DMRB 11.3.1 (updated to include HA207/07) contains a simple method that allows total emissions to be estimated and this is usually used for assessing strategic options. The STAG Part 2 Strategic Level assessment of the change of the PM<sub>10</sub> and NO<sub>2</sub> emissions at properties within the study area was therefore undertaken for all affected routes using the method described in DMRB 11.3.1. Emissions from road traffic were calculated using the 'Regional' worksheets of the screening spreadsheet v1.03 as per previous reference. The following input data was used to run the spreadsheet:

- i. the number of vehicle kilometers traveled;
- ii. the year of assessment;
- iii. average vehicle speed;
- iv. the proportion of heavy duty vehicles; and
- v. road type (used to define vehicle fleet composition).

Indicators used include the change in:

- i. the number of properties experiencing an increase/decrease in PM<sub>10</sub> emissions; and
- ii. the number of properties experiencing an increase/decrease in NO<sub>2</sub> emissions.

Annual Mean background concentration estimates were obtained from the UK Air Quality Archive (UKAQA) website<sup>2</sup>. Values were read from 1 x 1 km grid squares within the study area and attributed to each receptor modelled. To avoid double counting of emission contributions from sources explicitly included in the DMRB model, appropriate sector adjustment calculations were made to estimate Annual Mean background NO<sub>x</sub> and PM<sub>10</sub> concentrations. Annual Mean background NO<sub>2</sub> concentrations were calculated using the Background NO<sub>2</sub> Calculator<sup>3</sup>. The relevant background air pollutant concentrations for NO<sub>2</sub> and PM<sub>10</sub> are currently well below the Objection Limit value of 40 µg/m<sup>3</sup> for both 2008 baseline conditions and 2012 for the study area.

Stirling Council manages a network of diffusion tubes monitoring NO<sub>2</sub> concentration in the Stirling area. The monitored NO<sub>2</sub> concentrations have been bias adjusted

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<sup>2</sup> (<http://www.airquality.co.uk/laqm/laqm.php>).

<sup>3</sup> <http://www.airquality.co.uk/laqm/tools.php?tool=background08> – NO<sub>2</sub> Adjustment for NO<sub>x</sub> Sector Removal (version 2.1)

using the Stirling 2008 bias adjustment value<sup>4</sup>. The analysis of the diffusion monitoring data results in the vicinity of the study area indicated that Annual Mean NO<sub>2</sub> concentrations around the proposed scheme were below the Objective Limit Value in 2008 at all monitoring locations. At this time, the Council has not declared any Air Quality Management Areas (AQMAs) within Stirling.

#### Site 1

The likely air quality impacts, in terms of NO<sub>2</sub> and PM<sub>10</sub>, associated with Site 1 are presented below:

##### *Deterioration and Improvement*

1. NO<sub>2</sub> - The assessment has indicated that a) 1756 properties are likely to experience a deterioration, and b) 2124 properties are likely to experience an improvement in Annual Mean NO<sub>2</sub> concentrations. The scheme produces an overall benefit at 368 properties for NO<sub>2</sub>.
2. PM<sub>10</sub> . In addition, results have shown that a) 1336 properties are likely to experience a deterioration, and b) 2024 properties are likely to experience an improvement in Annual Mean PM<sub>10</sub> concentrations. The scheme produces an overall benefit at 688 properties for PM<sub>10</sub>.

Site 1 is likely to improve the air quality of Stirling due to reduced congestion, higher average speeds and a reduction in the vehicle movements on A872 and A91. The overall impact is assessed to be **Positive Moderate** in terms of air quality.

#### Site 5A

The likely air quality impacts, in terms of NO<sub>2</sub> and PM<sub>10</sub>, associated with Site 5A are presented below:

##### *Deterioration and Improvement*

3. NO<sub>2</sub> - The assessment has indicated that a) 103 properties are likely to experience a deterioration, and b) 3636 properties are likely to experience an improvement in Annual Mean NO<sub>2</sub> concentrations. The scheme produces an overall benefit at 3533 properties for NO<sub>2</sub>.
4. PM<sub>10</sub> . In addition, results have shown that a) 29 properties are likely to experience a deterioration, and b) 3239 properties are likely to experience an improvement in Annual Mean PM<sub>10</sub> concentrations. The scheme produces an overall benefit at 3210 properties for PM<sub>10</sub>.

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<sup>4</sup> <http://www.uwe.ac.uk/aqm/review/> - Spreadsheet of Bias Adjustment Factors (v.03/10)

Site 5A is likely to improve the air quality of Stirling due to reduced congestion, higher average speeds and a reduction in the vehicle movements on A872 and A91. The overall is assessed to be **Positive Moderate** in terms of air quality.

#### Site 8

The likely air quality impacts, in terms of NO<sub>2</sub> and PM<sub>10</sub>, associated with Site 8 are presented below:

#### *Deterioration and Improvement*

5. NO<sub>2</sub> - The assessment has indicated that a) 103 properties are likely to experience a deterioration, and b) 3636 properties are likely to experience an improvement in Annual Mean NO<sub>2</sub> concentrations. The scheme produces an overall benefit at 3533 properties for NO<sub>2</sub>.
6. PM<sub>10</sub> - In addition, results have shown that a) 29 properties are likely to experience a deterioration, and b) 3239 properties are likely to experience an improvement in Annual Mean PM<sub>10</sub> concentrations. The scheme produces an overall benefit at 3210 properties for PM<sub>10</sub>.

Site 8 is likely to improve the air quality of Stirling due to reduced congestion, higher average speeds and a reduction in the vehicle movements on A872 and A91. The overall impact is assessed to be **Positive Moderate** in terms of air quality.

### 3.3 Water Quality, Drainage and Flood Defence

#### Overview

There are no watercourses within the boundaries of or within close proximity to the three P&R sites. The closest watercourse is the Bannock Burn which SEPA advises is of Poor status in terms of the Water Framework Directive. Review of interactive maps provided on SEPA's website indicate that further west the Bannock Burn is classed as Bad ecological potential (heavily modified). The Bannock Burn is also designated as a salmonid water under the Freshwater Fish Directive. The Bannock Burn is, however, located approximately 500m from P&R sites 1 and 8, and approximately 250m from Site 5A.

It has been assumed that none of the three P&R sites are situated on the flood plain of the Bannock Burn. SEPA's Indicative River and Coastal Flood Map indicates that none of the three sites are liable to be at risk of flooding.

A major aquifer underlies the eastern part of **Site 8**, and this is classed as major where coinciding with the areas of glaciofluvial ice contact deposits and minor where the diamicton till is located. The aquifer underlying **Site 1** is classed as minor where coinciding with areas of diamicton till, and non-aquifer where bedrock is noted near to or at the surface. The hydrological map of Scotland (BGS, 1988) indicates that groundwater resources in the region have limited productive potential.

Based on the information above and using the definitions provided in Table 1, the three P&R sites are assessed as negligible/neutral sensitivity with respect to surface water quality and flood plain capacity (Bannock Burn outwith zone of predicted influence). With regard to groundwater, Sites 1 and 8 are assessed as low and Site 5A as negligible/neutral sensitivity.

#### Site 1

Site 1 is predicted to have a neutral level of impact magnitude with respect to surface water quality and flood plain capacity and therefore **No Impact** is predicted using the criteria in Table 3. For groundwater, a low level of magnitude is predicted for Site 1 due the identified aquifer (although only an issue if at shallow depth). The significance of impact is therefore assessed as **Negative Minor**.

#### Site 5A

Site 5A is predicted to have a neutral level of impact magnitude with respect to surface water quality, flood plain capacity and groundwater and therefore **No Impact** is predicted.

#### Site 8

Site 8 is predicted to have a neutral level of impact magnitude with respect to surface water quality and flood plain capacity and therefore **No Impact** is predicted. For groundwater, a low level of magnitude is predicted for Site 1 due the identified aquifer (although only an issue if at shallow depth). The significance of impact is therefore assessed as **Negative Minor**.

An increased flood risk is also a concern with run-off from new roads/car parks and, although this cannot be quantified at this stage, it is envisaged that due to the scale nature of works and with appropriate management of run-off from hard standing areas this will not be a significant issue for any of the 3 sites.

### 3.4 Geology (including contaminated land)

There are no known geological or geomorphological sites of specific importance within the vicinity of the three alternative P&R sites.

#### Drift Geology

Geological maps for **Sites 1 and 5A** show the soils to consist of diamicton till which may comprise clay, silty clay, be pebbly and sandy, possibly interbedded with sand and gravel-rich lenses and rare peat. At **Site 1**, bedrock is noted to be at or near to the ground surface. **Site 8** is noted to be underlain by diamicton till and glaciofluvial ice contact deposits (gravel, sand and silt).

#### Solid Geology

**Site 1, Site 5A, and Site 8** are all underlain by carboniferous sedimentary rock belonging to the Limestone Coal Formation, with bedrock at or near the surface. The Limestone Coal Group is known to consist principally of sandstones, siltstones

and mudstones with seat earths or seatclays and coals. The coal seams are rather variable in their development and vary from one coalfield to another making comparison difficult.

At **Site 1**, the Bannockburn Lower Main Coal, which has an N-S strike, outcrops within the site boundary, terminates on a fault that traverses the northern half of the site with a WSW-ENE alignment. The Bannockburn Lower Main Coal dips 5° to the east.

At **Site 5A**, the Lower Knott Coal, which has a N-S strike, outcrops within the site boundary. The Lower Knott Coal dips 10° to the northeast. The aquifer underlying this site is classed as minor.

At **Site 8**, the Knott Coal, which has a NNW-SSE strike, outcrops within the site boundary. This coal seam terminates at the fault, which crosses the northern portion of the site with a WSW to ENE alignment. The Knott Coal in this site dips 5° to the southeast.

#### Historical Land Uses

Review of historical maps and consultation with Stirling Council has revealed that **all three P&R sites** are shown as having been subject to underground mining historically. They are not shown as areas of probable shallow mining although Stirling Council advises that the reliability of this information is unclear.

The former Pirnhall Colliery and associated buildings was located immediately adjacent to **Site 5A** - historical maps (between 1938/51 and 1967/68) indicate the colliery at the northern edge of the site boundary. Mine spoil is indicated on the 1967/68 maps covering an area approx. 195m x 180m. Four former mineshafts are indicated at **Site 1** – historical maps (between 1865 and 1967/68) indicate disused coals shafts within and near to the site boundary (113m to the south). Risks from former mining activity will require to be addressed as part of any site redevelopment.

Stirling Council advises that Coal Authority searches are likely to be necessary to confirm the mining risks presented at each site, although they also state that, unless mining in these areas is shallow, significant risks are unlikely due to the nature of the proposed development.

Stirling Council has advised that **all three P&R sites** are located within 350m of the former Cat Craig Quarry/Landfill. Any ground gas risks presented to enclosed structures proposed for the site(s) would require to be addressed.

**Sites 5A and 8** have been used for unknown agricultural purposes historically. Some agricultural activities can introduce potential contamination into the ground.

**Site 1** is currently used as a Trotting Track and the western part of the site had a factory or works (use unknown) located on it historically, this was noted on the 1958 OS map as a mill, and also indicated on the 1967 map but not on the 1988 map.

Due to the previous land uses noted above, there is the potential for contamination to be present.

Based on the baseline information above and using the definitions provided in Table 1, Sites 1 and 5A are assessed as low to medium sensitivity in terms of mineral reserves and potential contamination. Site 1 is assessed as negligible/neutral sensitivity.

#### Site 1

Overall, the magnitude of impact for the development of Site 1 as a P&R is assessed as minor. The significance of impact would therefore be **Negative Minor**.

#### Site 5A

Overall, the magnitude of impact for the development of Site 5A as a P&R is assessed as minor. The significance of impact would therefore be **Negative Minor**.

#### Site 8

Overall, the magnitude of impact for the development of Site 1 as a P&R is assessed as minor. The significance of impact would therefore be **No Impact**.

### **3.5 Biodiversity and Habitats**

#### Overview

As supporting information to the STAG Part 2 Appraisal, an Extended Phase 1 Habitat Survey has been completed (specifically in relation to Sites 1, 5A and 8) and this included as Appendix 1. To summarise, there are no European or nationally designated sites of nature conservation value within the survey area. The closest such designation is Balquhiddelock Wood SSSI, which, at its closest points, is ~1.75km to the north of Site 1, 1.8km to the north east of Site 5A and 1.7km to the north east of Site 8.

As outlined in Appendix 1, habitats present mainly comprise improved grassland, with infrequent areas of amenity grassland, mixed plantation woodland, standard trees and species poor hedgerows. No protected species were recorded during the field survey, although some of the habitats present (mature standard trees and buildings) may support roosting bats. Indeed the desk study revealed records of bats within Site 1 and Site 8. There is also potential for badgers to utilise the farmland areas, for foraging. The surrounding farmland and wooded areas provide important habitat to farmland bird species, particularly during the breeding season.

The overall sensitivity of ecological features within the survey area is assessed as low across all of the sites.

Site 1

There is the risk of mortality and disturbance resulting from the destruction of any bat/barn owl roosts located in buildings. This has been assessed as being of major impact magnitude, using the criteria in Table 2 above, and therefore of **Negative Moderate** significance (based on Table 3). The loss of linear features such as walls and hedgerows could result in the loss and fragmentation of commuting habitat for bats. There is also the risk of mortality and habitat loss for breeding birds as a result of vegetation clearance. These have been assessed as being of minor impact magnitude and **Negative Minor** significance. However, should this site be selected, the design and construction of the P&R will be undertaken with the inclusion of appropriate mitigation so that negative impacts are minimised.

Site 5A

There is the risk of disturbance resulting to bat roosts located in mature trees. This has been assessed as being of major impact magnitude and **Negative Moderate** significance. The loss of linear features such as walls and hedgerows could result in the loss and fragmentation of commuting habitat for bats. There is also the risk of mortality and habitat loss for breeding birds as a result of vegetation clearance. These have been assessed as being minor impact magnitude and **Negative Minor** significance. However, should this site be selected, the design and construction of the park and ride will be undertaken with the inclusion of appropriate mitigation so that negative impacts are minimised.

Site 8

The loss of linear features such as walls and hedgerows could result in the loss and fragmentation of commuting habitat for bats. There is also the risk of mortality and habitat loss for breeding birds as a result of vegetation clearance. These have been assessed as being minor impact magnitude and **Negative Minor** significance. However, should this site be selected, the design and construction of the P&R will be undertaken with the inclusion of appropriate mitigation so that negative impacts are minimised.

### 3.6 Landscape

Overview

There are no Designed Landscapes or Gardens or specific landscape designations within the immediate vicinity of the three alternative P&R sites. The closest designated area lies to west of the M80 and this area is noted in the Local Plan as an Area of Great Landscape Value within which there is a presumption against development. None of the three P&R sites are located within this area.

The Local Plan also defines land to northwest of Bannockburn as Greenbelt, where there is a presumption against non-essential development. Areas of Greenbelt aim to prevent the coalescence of settlements, to protect landscape settings and to protect heritage features of national and/or regional importance.

Review of the Stirling to Grangemouth Landscape Character Assessment Report (1999) indicates that the three alternative P&R sites are located within the Lowland Hill Fringes landscape character type. This is described as a transitional area between the hills to the west and the Forth flatland to the east with the following key characteristics:

- rugged, elevated, craggy rock outcrops of dolerite above strongly rolling, pronounced hills sloping more gently to the Forth Valley floodplain;
- lochs, reservoirs, many east flowing burns and deep gorge of River Carron;
- rough and semi-improved grassland with gorse scrub on higher ground changing to improved pasture with some arable on lower ground;
- extensive coniferous and mixed plantations, broadleaved woodlands, policies, shelterbelts and avenues;
- stone dykes, beech, hawthorn and holly hedgerows;
- industrial villages and urban expansion on low ground, scattered steadings and estate houses on slopes;
- historic buildings and features throughout area; and
- many roads, including motorways, and railways and overhead lines on lower ground.

The local landscape can be characterized as urban fringe with the south of Stirling dominating the area to the north and Bannockburn to the northeast. The site for the proposed Durieshill residential development is located to the southwest of Stirling and the three P&R sites. The area is further urbanised by the existing road network – comprising the M9, M80 and Pirnhall Interchange to the south of all three P&R sites; the A872 to the west of Site 8 and east of Site 5A; and the A91 to the south of Site 1. There is also some commercial development within the local landscape, for example the Pirnhall business park adjacent to the A872 on the approach into Stirling. The new Development Plan may also identify further sites for commercial/business development in the south of Stirling area.

In terms of sensitivity to change, the landscape of area in which the three sites are situated has a low to medium sensitivity to change.

#### Site 1

Site 1 is located outwith the Greenbelt, within an area identified for potential future redevelopment. The eastern part of this site is currently used informally as a lorry park. Considering the local environmental context, the magnitude of change to the landscape character associated with development of Site 1 as a P&R is assessed as minor. The significance of impact would therefore be **Negative Minor**. This assumes that appropriate effective landscaping is included in the design and construction of a P&R.

#### Site 5A

This site is located within Greenbelt land, however this site is included within an area under consideration as part of the Local Development Plan for commercial/business development. The magnitude of change to the landscape character associated with

development of Site 5A as a P&R (with the inclusion of landscaping) is assessed as minor. The significance of impact would therefore be **Negative Minor**.

#### Site 8

Site 8 is located within Greenbelt land. The magnitude of change to the landscape character associated with development of Site 8 as a P&R is assessed as minor, based on the inclusion of well designed and implemented landscaping. The significance of impact would therefore be **Negative Minor**.

### 3.7 Visual Amenity

#### Overview

There are a range of receptors that may be sensitive to changes in visual amenity resulting from development. Key receptors which may be intervisible with the three P&R sites comprise the following:

- Residential receptors, including properties on the edge of Bannockburn and at Muiralehouse; Hillhead and Croftside Farm to north; Bannockburn House and Back o'muir to east; and other individual farmsteads.
- Pirn Hall Premier Inn situated adjacent to the A872.
- Brucefields Family Golf Centre to the north of the A91 off Pirnhall Road.
- Users of the adjacent road and path network.
- Public viewpoints in the area.

In terms of visual amenity the area is considered of to be of medium value as, although receptor views comprise residential properties, these views are already influenced by setting with the presence of major road interchanges and the urban edge of Stirling.

#### Site 1

Key receptors include residential properties at Muiralehouse and the southern edge of Bannockburn; Brucefields golf course and golf driving range; users of local countryside paths; Pirnhall Road; Eastern Distributor Road (A91); farms and Bannockburn Hospital on east side of A91. Consultation with Stirling Council indicated that Site 1 is intervisible with some important public viewpoints at greater distances, e.g. Dumyat and possibly Wallace Monument and Stirling Castle. The magnitude of change to visual amenity associated with development of Site 1 as a P&R is assessed as moderate. The significance of impact would therefore be **Negative Moderate**.

#### Site 5A

Key receptors include Pirnhall Farm; Hillhead Farm; Croftside Farm; residential properties at southern edge of Bannockburn; Premier Inn; Brucefields golf course and golf driving range; motorways/interchange; users of the A872 and local countryside roads/paths. Consultation with Stirling Council indicated that Site 5A is sensitive site in the context of views / visitor experience from the Bannockburn Monument (A listed structure) and the approach into Stirling. The magnitude of

change to visual amenity associated with development of Site 5A as a P&R is assessed as moderate. The significance of impact would therefore be **Negative Moderate**.

### Site 8

Key receptors include Pirnhall Farm; Hillhead Farm; Croftside Farm; residential properties at Muiralehouse and southern edge of Bannockburn; Inn; Brucefields golf course and golf driving range; users of the A872, the A91, local countryside roads/paths, inc. Core Paths along the local road to Croftside Farm and Cat Craig. Stirling Council indicated that the site is likely to be intervisible with some key viewpoints, but easier to screen than the sites on sloping ground. The magnitude of change to visual amenity associated with development of Site 8 as a P&R is assessed as moderate. The significance of impact would therefore be **Negative Moderate**.

## 3.8 Agriculture and Soils

All three P&R sites are situated on land classed as moderate capability for agriculture. No prime agricultural land will be affected. Review of Soil Survey of Scotland maps indicates that Sites 1 and 8 comprise till soils derived from carboniferous sediments of the Giffnock association, whilst Site 5A also comprises soils from fluvio-glacial sands and gravels of the Darvel association.

The sensitivity of all three sites is therefore assessed as medium. Although the magnitude of impact is considered to be moderate for the immediate site, as the land will no longer be available for agricultural purposes, the size of the area lost is relatively small. The impact significance, based on the criteria set out above, would, however, be **Negative Moderate** for all three sites.

## 3.9 Cultural Heritage

### Overview

There are no Scheduled Ancient Monuments (SAMs) or Listed Buildings within the immediate vicinity of the three alternative P&R sites being considered for detailed appraisal. The closest SAM, Common Hill homestead (Roman outpost), lies approximately 1 km southeast of Pirnhall Interchange (Junction 9). The closest Listed Buildings are:

- Bannockburn House just east of Junction 9: this site includes a number of Listed Buildings - Bannockburn House Category A; Gatepiers, Bannockburn House Category B; Dovecot, Bannockburn House – Category B).
- Auchenbowie House approx. 1.5 km southwest of Junction 9: comprises Auchenbowie House Category A; and Sundial – Auchenbowie House Category B.

There are several other sites noted on Sites and Monuments Record for the study area such as 7 sites in the motorway service area triangle (however these are likely

to have been demolished due to M80/service area construction) and a few noted sites immediately southeast of Junction 9. Many of the sites relate to features recorded over time which may not necessarily pose significant constraints to development but should be avoided if possible. A confirmed list of sites and their value will be obtained from Stirling Council Archaeology Department.

#### Site 1

Stirling Council has advised that Site 1 is likely to be within the Battle of Bannockburn site (Inventory area for battle site currently being drafted by Historic Scotland), but this not seen as significant constraint by Stirling Council.

The value of Site 1 in cultural heritage terms is assessed as negligible to low, the magnitude of impact as minor and the significance of impact **Negative Minor**.

#### Site 5A

During consultation Stirling Council advised that Site 5A has been identified by the Historic Land-use Assessment (HLA) as comprising 18th-20th century smallholdings. These 19th century smallholdings, which may originate in the 18th century, show an irregular pattern of small fields, representing crofts. The field sizes are smaller than surrounding fields on the OS 1st edition map and irregular in shape which indicates smallholdings. The OS name book describes the name buildings as farm houses and steadings. Small clusters of buildings are shown on Roys map in this area. The area is distinct from the surrounding landscape and interesting at a regional level. They are a locally unusual survival when compared to the rest of the Council area, especially so close to the urban area. Site 5A is also likely to lie within the Battle of Bannockburn site boundary. Historic OS maps also indicate the line of a roman road passing through Site 5A up until 1938 - the road does not appear on the 1958 map although it is included in the sites and monuments record for the Stirling area. A farmstead and colliery are also included in the records.

The value of Site 5A in cultural heritage terms is assessed as low to medium, the magnitude of impact as minor and the significance of impact **Negative Minor**.

#### Site 8

Site 8 may lie within the area identified by the HLA as comprising 18th-20th century smallholdings. The site is also likely to lie within the Battle of Bannockburn site boundary.

The value of Site 8 in cultural heritage terms is assessed as low to medium, the magnitude of impact as minor and the significance of impact **Negative Minor**.

### **3.10 Physical Fitness**

This aspect relates to the promotion of physical activity through active, healthy and sustainable modes of transport such as walking and cycling. In terms of the P&R facility it is proposed that cycling facilities will be provided and links to public pathways made where possible. It is considered at this stage that all three sites

have an equal footing in this sense, although it is noted that Site 8 is adjacent to the Core Path linking to Cat Craig and the edge of Bannockburn.

## 4 Summary

### 4.1 Comparison of Sites

Table 4 below indicates that all three sites are generally comparable in terms of potential environmental impact. There are a couple of marginal differences, highlighted in red, where a lesser level of impact (compared to the other two sites) is predicted at this stage. Site 8 scores better for two environmental sub-criteria and Sites 1 and 5A on one each.

However, it should be noted that, based on this strategic level assessment and considering the nature, scale and characteristics of the proposals, there are no overriding environmental reasons why any of the three sites could not be further progressed.

**Table 4 Site Comparison.**

Environmental Sub-criteria	Site 1	Site 5A	Site 8
Noise and Vibration	No Impact	No Impact	No Impact
Global Air Quality	Positive Minor	Positive Minor	Positive Minor
Local Air Quality	Positive Minor	Positive Moderate	Positive Moderate
Water Quality, etc	No Impact	No Impact	No Impact
Groundwater	Negative Minor	No Impact	Negative Minor
Geology	Negative Minor	Negative Minor	No Impact
Biodiversity and Habitats	Negative Minor/Moderate	Negative Minor/Moderate	Negative Minor
Landscape	Negative Minor	Negative Minor	Negative Minor
Visual Amenity	Negative Moderate	Negative Moderate	Negative Moderate
Agriculture and Soils	Negative Moderate	Negative Moderate	Negative Moderate

### 4.2 Summary of Key Issues

#### Water Quality, Drainage and Flood Defence

- Appropriate and adequate site drainage – SuDS should be included.
- Consider where shallow groundwater might be an issue

#### Geology

- Obtain Coal Mining Reports to gather more information of former coal mining activity – particularly applies to Sites 1 and 5A.

- If any evidence of contamination became evident during development of any of the sites Stirling Council Environmental Health department should be notified and the contamination investigated and the area remediated as necessary.

#### Biodiversity

- Avoid tree loss where possible.
- Avoid bird breeding season during site clearance.
- Bat emergence survey required to confirm presence/absence of bats within buildings/trees for Sites 1 and 5A.
- Retain linear vegetation features which provide bat commuting route.
- Sensitive lighting design.

#### Landscape

- Sites 5A and 8 are within Greenbelt land and the progression of either of these sites will require further discussion with Stirling Council.
- Design, implement and maintain appropriate site screening/landscaping and lighting.

#### Visual Amenity

- Receptors to be more clearly defined and issues considered further as the appraisal process moves forward.

#### Agriculture and Soils

- Consider land take issues and land ownership.

#### Cultural Heritage

- Confirm Battle of Bannockburn site boundary with Historic Scotland once information is available and review with Stirling Council.
- Further consider potential impact on 18th-20th century smallholdings for Sites 5A and 8.

## 5 Appendix 1

# South of Stirling Park & Ride Feasibility Study – Ecological Appraisal

31 March 2010

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# 1 Introduction

## 1.1 Background

Mouchel Ecology was commissioned to undertake a Phase 1 Habitat (extended) survey at three sites, for the provision of a new Park and Ride facility, located to the south of Stirling.

## 1.2 Location of Sites

The sites (Site 1, Site 5a and Site 8) lie within the jurisdiction of Stirling Council and are located to the south of the city and north-east of the M9.

Site 1 (see Appendix 3, Photograph 1) is located at grid reference NS 80983 89365 comprises Corbiewood Stadium, associated parking facilities and, at its eastern extent, a crossroads formed by the A91 and Pirnhall Road.

Site 5A (see Appendix 3, Photograph 2) is located at grid reference NS 80257 89437 is bounded to the north by the FES limited builders yard and to the east by the A872 carriageway. The southern and western boundaries comprise farmland.

Site 8 (see Appendix 3, Photograph 3) is located at grid reference NS 80400 89300 is abutted by Pirnhall Road to the south and the A872 carriageway to the west. Farmland forms the northern and eastern boundaries to this site.

## 1.3 Aims

This report presents the results of the Phase 1 Habitat survey and evaluates the nature conservation interest present. In addition, an assessment of potential ecological constraints and associated safeguard measures is provided.

## 2 Methodology

### 2.1 Desk Study

Prior to the surveys being undertaken, a search of the National Biodiversity Network (NBN) was undertaken to provide background records of protected species recorded in the area.

### 2.2 Phase 1 Habitat Survey (Extended)

#### 2.2.1 Site Locations

The sites covered by the Phase 1 Habitat Survey (Extended) are illustrated in Appendix 1 (Figure 1: Phase 1 Habitat Map). The figure illustrates the boundaries of each site and any adjacent features of ecological interest.

#### 2.2.2 Methods

A Phase 1 Habitat Survey (Extended) was undertaken for each site using the standard methodology as outlined in the Handbook for Phase 1 Habitat Survey – a technique for environmental audit (JNCC, 2007). Botanical taxonomic nomenclature followed that of Stace (1997).

Phase 1 Habitat Surveys are undertaken in order to generate baseline information and to highlight areas necessary for further survey (i.e. those of particular interest for their flora or importance as habitat for protected species).

At the time of survey additional target notes are taken to record other key habitat features e.g. urbanised ecological features not covered in sufficient detail in the Phase 1 Habitat Survey methodology, important habitats too small to be mapped, dominant species and other features of ecological significance. Areas of particular botanical interest were surveyed in greater detail with species lists prepared and a record made of relative abundance on the DAFOR (dominant, abundant, frequent, occasional and rare) scale.

### 2.3 Determining Ecological Value

The methods used for assessing value of an ecological receptor requires the use of all information collated, to determine the baseline status of the resource. The evaluation of an ecological feature is aimed at assigning nature conservation value with regard to the local distribution and status of different habitat types, and protected species present.

Evaluation of the ecological features was based on the Ratcliffe criteria (Ratcliffe, 1977) and Institute of Ecology and Environmental Management (IEEM) guidelines for site evaluation, as outlined in their guidelines for EIA (IEEM, 2006). These criteria are presented in Table 1 below.

Table 1: Value of Ecological Receptor

Value of Ecological Receptor	
Value	Criteria
International (European)	<p><b>Habitats</b></p> <p>An internationally designated site or candidate site, i.e. Special Protection Area (SPA), provisional SPA (pSPA), Special Areas of Conservation (SAC), candidate SAC (cSAC), Ramsar Site, Biogenetic/Biosphere Reserve, World Heritage Site, or an area, which would meet the published selection criteria for designation. A viable area of a habitat type listed in Annex I of the Habitats Directive (92/43/EEC), or smaller areas of such habitat that are essential to maintain the viability of a larger whole. Any waterbody classified under the Water Framework Directive (2000/60/EC) and considered to be of <i>High</i> status, and not at risk of failing to achieve an environmental objective (2a &amp; 2b). Any river designated as a Salmonid water under the Freshwater Fish Directive (2006/44/EC), and likely to support a substantial salmonid population. Any river with a Habitat Quality Score (HQS)/Habitat Modification Score (HMS) indicating that it is Pristine, Semi-Natural or Obviously Modified.</p> <p><b>Species</b></p> <p>Any regularly occurring population of internationally important species, threatened or rare in the UK, i.e. a UK Red Data Book species categories 1 and 2 of UK BAP or of uncertain conservation status or of global conservation concern in the UK BAP. A regularly occurring, nationally significant population/number of an internationally important species.</p>
National (Scottish)	<p><b>Habitats</b></p> <p>A nationally designated site, i.e. Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), Marine Nature Reserve (MNR) or a discrete area, which would meet the published selection criteria for national designation (e.g. SSSI selection guidelines). A viable area of a priority habitat identified in the UK Biodiversity Action Plan (UK BAP), or smaller areas of such habitat essential to maintain wider viability. Any waterbody classified under the Water Framework Directive (2000/60/EC), considered to be of <i>High-Good</i> status, and not at risk of failing to achieve an environmental objective (2a &amp; 2b). Any river designated as a Salmonid water under the Freshwater Fish Directive (2006/44/EC), and likely to support a substantial salmonid population. Any river with a Habitat Quality Score (HQS)/Habitat Modification Score (HMS) indicating that it is Pristine or Semi-Natural or Obviously Modified.</p> <p><b>Species</b></p> <p>A regularly occurring, regionally or county significant population / number of an internationally/nationally important species. Any regularly occurring population of a nationally important species that is of a threatened or rare conservation status in the region or county (see local BAP). A feature identified as of critical importance in the UK BAP.</p>
Regional (Argyll, the Isles, Loch Lomond, Stirling and Trossachs)	<p><b>Habitats</b></p> <p>Sites that exceed the County-level designations but fall short of SSSI selection criteria. Viable areas of key habitat identified in the UKBAP or smaller areas of habitat essential to maintain wider viability. Viable areas of key habitat identified as of Regional value in the appropriate SNH Natural Heritage Future area profile. Any waterbody classified under the Water Framework Directive (2000/60/EC), and considered to be of Good-Moderate status not at risk of failing to achieve an environmental objective (2a &amp; 2b - 1a &amp; 1b). Any river designated as a Salmonid or Cyprinid water under the Freshwater Fish Directive, and likely to support a salmonid or cyprinid population. Any river with a Habitat Quality Score (HQS)/Habitat Modification Score (HMS) indicating a range that it is Pristine or Semi-Natural or Obviously Modified to Significantly Modified or Above.</p> <p><b>Species</b></p>

Value of Ecological Receptor	
Value	Criteria
	<p>Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UKBAP or relevant SNH Natural Heritage Future area on account of it's regional rarity or localisation. A regularly occurring, locally significant population/number of a regionally important species. Sites maintaining populations of internationally/nationally important species that are not threatened or rare in the region or county.</p>
County (Stirlingshire)	<p><b>Habitats</b></p> <p>Sites recognised by local authorities, e.g. District Wildlife Sites (DWS) and Sites of Interest for Nature Conservation (SINCs). County/District Sites that the designating authority has determined, meet the published ecological selection criteria for designation, including Local Nature Reserves (LNR). A diverse and/or ecologically valuable hedgerow network. Semi-natural ancient woodland greater than 025 ha. Any waterbody classified under the Water Framework Directive (2000/60/EC) and considered to be of Moderate Status , and not at risk of failing to achieve an environmental objective (2a &amp; 2b - 1a &amp; 1b). Any river designated as a Salmonid or Cyprinid water under the Freshwater Fish Directive, and likely to support a salmonid or cyprinid population. Any river with a Habitat Quality Score (HQS)/ Habitat Modification Score (HMS) indicating a range that it is Pristine or Semi-Natural or Obviously Modified to Significantly Modified or Above.</p> <p><b>Species</b></p> <p>Any regularly occurring, locally significant population of a species listed in a Local BAP due to county rarity or localisation. A regularly occurring, locally significant population of a County/District important species. Sites supporting populations of internationally/nationally/regionally important species that are not threatened or rare in the region or county and not integral to maintaining those populations. Sites/features scarce in the County/District or which appreciably enrich the County/ District habitat resource.</p>
Local (Immediate Local Area)	<p><b>Habitats</b></p> <p>Areas of habitat that appreciably enrich the local habitat resource (e.g. species-rich hedgerows, ponds). Sites that retain other elements of semi-natural vegetation that due to their size, quality or the wide distribution within the local area are not considered for the above classifications. Semi-natural ancient woodland smaller than 0.25ha. Any waterbody classified under the Water Framework Directive (2000/60/EC), considered to be of Poor Status, and at risk of failing to meet an environmental objective (1a &amp; 1b) or not categorised at all. Any river not likely to support a cyprinid population / likely absence of fish fauna. Any river with a Habitat Quality/Modification Score indicating Significantly Modified or Above.</p> <p><b>Species</b></p> <p>Populations/assemblages of species that appreciable enrich the biodiversity resource within the local context. Sites supporting populations of county/district important species that are not threatened or rare in the region or county and are not integral to maintaining those populations.</p>
Less than Local (Limited Ecological Value)	<p>Sites that retain habitats and/or species of limited ecological importance due to their size, species composition or other factors. Any waterbody classified under the Water Framework Directive (2000/60/EC), considered to be of Poor-Not classified and at risk of failing to achieve an environmental objective (1a &amp; 1b), or not categorised at all. Any river not likely to support a cyprinid population / likely absence of fish fauna. Any river with a Habitat Quality Score (HQS)/ Habitat Modification Score (HMS) indicating Significantly Modified or Above.</p>

## **2.4 Survey Limitations**

It should be noted that early spring is not an optimal time of year for vegetation surveys, as it is outwith the main growing/flowering season. As such, this survey is unlikely to identify any individually protected plant species that may be present.

It is a feature of the 'extended' element of the Phase 1 Habitat Survey to record evidence of protected species activity and it should be noted that although the survey date 23<sup>rd</sup> of March is outwith the optimal time for surveying for amphibians, reptiles and bats; it is still possible to record suitable habitats for these species.

## 3 Results

### 3.1 Data Consultation

A search of the NBN (presented in Table 2 below) has returned specific records of the following protected/UKBAP species within 3km of the study area:

Table 2: NBN Protected/UKBAP Species within 3km of the Study Area

NBN Protected/UKBAP Species	
Species	Distance from Study Area
Red Squirrel ( <i>Sciurus vulgaris</i> )	~ 2km northwest of Site 5a
Brown long eared bat ( <i>Plecotus auritus</i> )	~ 2km north of Site 8
Soprano pipistrelle bat ( <i>Pipistrellus pygmaeus</i> )	Within 100m squares which include site 1 and site 8.

### 3.2 Designated Sites

There are no statutory designated sites within the study area. The closest designated site is Balquhiddelock Wood SSSI, which, at its closest point, is ~1.75km to the north of Site 1, 1.8km north-east of site 5A, and 1.7km north-east of site 8.

Balquhiddelock Wood is a small remnant of mixed deciduous woodland. Such native deciduous woodland is now rare in the eastern part of Stirlingshire, and alder (*Alnus glutinosa*) woodland like that in parts of Balquidderock is uncommon throughout central Scotland. Although relatively small, the wood has a naturally diverse structure and supports an exceptionally large number of vascular plant species.

### 3.3 Phase 1 Habitat Survey (Extended)

The Phase 1 Habitat Survey (extended) was conducted on 23<sup>rd</sup> March 2009.

#### 3.3.1 Habitats

Broadly speaking, the habitats within site 1 largely comprise an area of amenity grassland, surrounded by bare ground and buildings. Some hedgerows and standard trees are also present.

By contrast, sites 5A and 8 mostly comprise improved grassland in the form of grazed pasture. A breakdown of the habitats recorded at each site is presented in Tables 3-5 below and are illustrated in Appendix 1 (Figure 1 – Phase 1 Habitat Survey Map).

Table 3: Phase 1 Habitat Survey Results for Site 1

Phase 1 Habitat Survey Results – Site 1	
Habitat Classification	Area Description and Location
Hedgerows	An unmanaged hedgerow (Appendix 2 - Target Note 11) forms the northern and part of the western boundary of the site. It comprises a mixture of native and ornamental species including occasional holly ( <i>Ilex aquifolium</i> ), frequent laurel ( <i>Prunus</i> sp.) and bramble ( <i>Rubus fruticosus</i> agg.).
Buildings	A series of buildings are located within the site (Appendix 2 - Target Note 12). These comprise of kennels and stables and are located at the south-west boundary. The main stadium building is located adjacent to the southern extent of the racetrack. It comprises a bar and adjoining disused premises. The disused premises are in a poor state of repair.
Standard Conifer Trees	A line of mature Leyland Cypress ( <i>Cuprocyparis leylandii</i> ) forms part of the southern site boundary (Appendix 2 - Target Note 13).
Poor Semi-Improved Grassland	Poor semi-improved grassland is present at the fringes of the cross-roads, at the eastern end of the site (Appendix 2 - Target Note 14). Herb species recorded include creeping buttercup ( <i>Ranunculus repens</i> ), clover ( <i>Trifolium</i> sp.), knapweed ( <i>Centaurea nigra</i> ), cow parsley ( <i>Anthriscus sylvestris</i> ) and mouse ear ( <i>Cerastium fontanum</i> ).
Amenity Grassland	An oval area of amenity grassland is surrounded by the racetrack (Appendix 2 - Target Note 16).
Bare Ground	Several areas of bare ground are present, comprising the car park at the east of the site, associated roads, and the track itself.

Table 4: Phase 1 Habitat Survey Results for Site 5A

Phase 1 Habitat Survey Results – Site 5A	
Habitat Classification	Area Description and Location
Improved Grassland	This habitat is prevalent in the site on free draining soils and is frequently grazed by sheep. Species composition comprises coarse grass species such as cocksfoot ( <i>Dactylis glomerata</i> ) and Yorkshire fog ( <i>Holcus lanatus</i> ). Few herbs were recorded to be present.
Hedgerows	This habitat forms a field boundary within the site (Appendix 2 - Target Note 1). It is well managed, largely comprising hawthorn ( <i>Crataegus monogyna</i> ), with occasional ivy and dog rose ( <i>Rosa canina</i> ) also present.

Phase 1 Habitat Survey Results – Site 5A	
Habitat Classification	Area Description and Location
Amenity Grassland	A single rectangular area of amenity grassland is present at the eastern end of the site (Appendix 2 - Target Note 6).
Standard Broadleaved Trees	Standard broadleaved trees are found in limited numbers throughout the site. They largely comprise birch ( <i>betula</i> sp.), ash ( <i>Fraxinus excelsior</i> ), oak ( <i>Quercus robur</i> ) and elder ( <i>Sambucus nigra</i> ).
Mixed Plantation	Two areas of mixed plantation are present in the area of amenity grassland to the western edge of the site (Appendix 2 - Target Note 7). The plantations comprise a mixture of coniferous and broadleaf species including pine ( <i>Pinus</i> sp.) and larch ( <i>Larix decidua</i> ), and broadleaved species such as beech ( <i>Fagus sylvatica</i> ) and birch. A further line of mixed plantation is located on an embankment adjacent to the north boundary. This is semi-mature in nature and with a similar species composition, but also includes elder and ash.

Table 5: Phase 1 Habitat Survey Results for Site 8

Phase 1 Habitat Survey Results – Site 8	
Habitat Classification	Area Description and Location
Improved Grassland	Again this is the prevalent habitat present with a species composition similar to that described in Table 4. In this instance, it is grazed by cattle and horses.
Stone Walls	Stone walls bound the eastern, southern and western boundaries of this site.
Standard Broadleaved Trees	Some semi-mature standard broadleaved trees are present along the eastern site boundary and run north from the north-eastern corner of the site. Species recorded include ash oak, and beech (Appendix 2 - Target Notes 18 and 19).
Scattered Scrub	A small area of scattered scrub lies adjacent to the south-eastern site boundary. This largely comprises gorse ( <i>Ulex europaeus</i> ) (Appendix 2 - Target Note 20).

### 3.4 Protected Faunal Species

#### 3.4.1 Bats

##### **Roosting**

Two roosting bat opportunities are present in mature standard broadleaved trees, which lie adjacent to site 5A. A mature standard ash tree located to the south-west of the site has some small cracks on its trunk and also has a broken limb (Appendix 2 - Target Note 5). Another large standard tree positioned to the south-eastern edge of the site (Appendix 2 -Target Note 10) has rot holes in the trunk. The disused premises associated with the main stadium building in site 1 (Appendix 2 - Target Note 12) are in a poor state of repair with some gaps recorded, allowing bat access to loft voids. Both mature trees and the disused premises are considered to have medium potential to support roosting bats.

##### **Foraging/Commuting**

The small areas of scrub, woodland and mixed plantation within sites 5A and 8 offer some limited foraging opportunities for bats. Linear features used for navigation by commuting bats (namely lines of trees, stone walls and hedgerows) were recorded at all of the sites.

#### 3.4.2 Badger

##### **Setts**

No badger (*Meles meles*) setts were recorded at any of the sites.

##### **Foraging/Commuting**

Two 'push-throughs' were recorded under the post and rail fencing adjacent to the northern boundary of site 5A (Appendix 2 - Target Note 4). No other evidence of badger was recorded at any of the sites during the survey visit.

#### 3.4.3 Red Squirrel

The closest record of red squirrel returned for the NBN is located ~2km north west of site 5A. No evidence of this species was recorded at any of the sites during the survey visit.

#### 3.4.4 Birds

No specially protected bird species were recorded during the survey visit. A number of common bird species were recorded. These included sparrowhawk (*Accipiter nisus*), blue tit (*Cyanistes caeruleus*), chaffinch (*Fringilla coelebs*), goldfinch (*Carduelis carduelis*), wren (*Troglodytes troglodytes*) and blackbird (*Turdus merula*).

## 4 Evaluation

### 4.1 Habitats

#### 4.1.1 Legislation

Semi-natural habitats are conferred legal protection through international and national statutes. These recognise the ecological value of the habitats and provide protection or promote policies that guide their conservation.

The European Union's Council Directive on the Conservation of Natural Habitats and Wild Flora and Fauna (92/43/EEC) (the Habitats Directive, 1992) aims to promote the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species at a favourable conservation status. In applying these measures, Member States are required to take account of economic, social and cultural requirements as well as regional and local characteristics.

These habitats and species are to be protected by the creation of a series of 'Special Areas of Conservation' (SACs) (Article 4), Special Protection Areas designated under the Birds Directive (79/409/EEC); and by various other safeguard measures for particular species. Annex 1 of the Habitats Directive lists 189 habitats, 76 of which occur in the UK. In addition, a series of Annex 1 habitats are afforded 'priority' status as these are judged to be in particular danger of loss (Article 1). Twenty-three of these priority habitats occur in the UK.

Nationally important sites are designated as SSSIs in England, Scotland and Wales and conferred protection under various statutes including the Wildlife and Countryside Act 1981 (as amended) (WCA) and the Nature Conservation (Scotland) Act 2004 (NCSA).

The NCSA requires Scottish Ministers to publish a list of habitats and species considered to be of principle importance for biodiversity. In addition the Act requires that all public bodies have an obligation to protect and enhance biodiversity in the course of carrying out all their public duties.

The Environmental Liability Directive (2004/35/EC) is transposed into national statute through the Environmental Liability (Scotland) Regulations 2009. The directive establishes a framework for environmental liability based on the "*polluter pays*" principle, with a view to preventing and remedying environmental damage. Under the terms of the regulations, environmental damage to protected species is that which has a significant adverse effect on the species reaching or maintaining favourable conservation status, and where it is caused by an activity where the operator was at fault or was negligent as to whether such damage would be caused. The directive defines protected species as those listed in Annex I of the Wild Birds Directive (79/409/EEC) and in Annexes II and IV of the Habitats Directive.

#### 4.1.2 *Evaluation*

None of the habitats within the current study area are afforded any special protection under the legislation mentioned above.

Based on the criteria described in Table 1 and the results of the field survey, it is considered that the mature standard trees, small areas of mixed plantation woodland and hedgerows are of **Local** value, the remaining habitats are of little to no ecological interest, and, as such, are considered to be of **Less than Local** value.

## 4.2 **Bats**

### 4.2.1 *Legislation*

Bats and the places which they use for shelter/roosting are protected under Annex IV of the Habitats Directive affording them the title European Protected Species (EPS). Some bat species are listed in Annex II of the Habitats Directive, requiring the designation of SACs for their conservation. However none of the bat species included in Annex II are known to exist this far north in the UK.

Recent amendments to the Habitats Regulations (Amendment No. 2 (Scotland) Regulations 2007 – S.I. 2007/80) strengthened the legal protection and effectively removed bats from the provisions of the WCA and the NCSA. Protection of this EPS therefore rests with the amended Habitats Regulations, removing many of the defences previously available under the WCA and making non-compliance with a derogation (license) a criminal offence.

Under the above legislation it is an offence to deliberately or recklessly:

- Capture, injure or kill a bat;
- Disturb bats;
- Obstruct access to a bat roost;
- Damage or destroy a place used for shelter or protection (even if they are not occupied at the time); or
- Possess or advertise, sell or exchange a live or dead bat or part of a bat.

Under Articles 1 and 2 of the Habitats Directive, there is a requirement to maintain or restore natural habitats and species of community interest at Favourable Conservation Status (FCS), i.e. the ecological circumstances must be such that there is a reasonable expectation that the habitat or species will be maintained in that condition in the long term. Bats are classed as species of community interest through their inclusion in Annex IV of the Habitats Directive. In order to ensure that bat species are maintained at FCS, it is necessary to maintain the following in the long term:

- Populations of the species (including the range of genetic types where relevant) as a viable component of the study area;
- Distribution of species within the study area;
- Distribution and extent of habitats supporting the species; and

- Structure, function and supporting process of habitats supporting the species.

#### 4.2.2 *Evaluation*

Both the mature trees adjacent to site 5A and the disused premises at site 1 are considered to have medium potential to support roosting bats. As such, they have been assessed as being of **Local** value for this species group. The hedgerows, stone walls and tree lines can act as linear navigation features for bats, and as such, they have also been assessed as being of **Local** value for this species group. Foraging opportunities throughout all of the sites are limited at best, as such they are considered to be of **Less than Local** value.

### 4.3 **Badger**

#### 4.3.1 *Legislation*

Badgers are legally protected from intentional cruelty, such as badger-baiting and from the results of lawful human activities, such as housing, road or other developments, under the Protection of Badgers Act 1992 (PBA), which was amended by the NCSA. The PBA consolidates all previous legislation including the Badgers Act 1973 (as amended) and the Badgers (Further Protection) Act 1991.

Badgers are afforded full protection from wilful or attempted killing, injuring and interference with the badger's sett. The PBA defines a badger sett as: 'any structure or place, which displays signs indicating current use by a badger'. Badgers are also given protection from killing or taking by certain means under Schedule 6 of the WCA.

Legal activities, subject to compliance with conditions in the PBA, include habitat loss through road and housing developments, forestry and agricultural operations.

#### 4.3.2 *Evaluation*

Although no setts were recorded during the survey, the small strip of mixed plantation woodland adjacent and north of site 5A sits on an embankment and this is considered to provide sub-optimal sett making habitat. Two push-throughs were recorded in this area (Appendix 2 - Target Note 4), which is evidence for possible badger presence. However, with no other evidence recorded, this is inconclusive. Upon consideration of the above, this area is considered to be of **Local** value for this species.

The improved grassland fields are likely to support an ample source of earth worms (the preferred food source of badger), and are also considered to be of **Local** value for badger.

The remaining habitats are of **Less than Local** value for badger.

## 4.4 Birds

### 4.4.1 Legislation

The WCA 1981 and the NCSA 2004 ensure that all wild birds, their nests and eggs, are protected at the national level. They make it an offence to:

- Intentionally or recklessly kill, injure or take any wild bird;
- Intentionally or recklessly take, damage or destroy the nest of any wild bird while it is in use or being built;
- Intentionally or recklessly take or destroy the egg of any wild bird; and
- Intentionally or recklessly disturb any wild bird listed on Schedule 1 while it is nest building or is at (or near) a nest with eggs or young; or disturb the dependent young of such a bird without a Schedule 1 licence provided by Scottish Natural Heritage (SNH).

### 4.4.2 Evaluation

Although no specially protected birds were recorded in any of the sites during the survey visit, the disused premises associated with the main stadium building (site 1) may provide some roosting potential for the Schedule 1 species barn owl (*Tyto alba*). Furthermore, the standard trees, areas of mixed plantation woodland, hedgerows and scattered scrub all provide suitable nesting habitat for birds and as such, are considered to be of **Local** value for this species group.

The remainder of the habitats are considered to be of **Less than Local** value for birds.

## 5 Constraints

A summary of the constraints specific to each site is given in Table 6 below and safeguard measures are presented in order to protect any features of ecological value.

Table 6: Ecological Constraints and Safeguard Measures

Constraints and Safeguard Measures		
Ecological Receptor	Ecological Constraint	Safeguard Measure
Mixed plantation woodland, hedgerows, trees and scattered scrub.	Vegetation clearance at all sites leading to potential destruction of bird nests, leading to mortality.	Clearance of any potential nesting bird habitat should be undertaken outwith the main breeding season (April-July inclusive). If this is not possible, areas to be removed must first be checked by a suitably experienced ecologist/ornithologist.
Buildings.	Potential mortality or disturbance resulting from the destruction of bat/barn owl roosts at site 1.	Emergence survey required to confirm presence/absence of these species.
Mature standard trees (Appendix 2 - Target Notes 5 & 10).	Potential disturbance to roosting bats at site 5A.	Any permanent lighting should be sensitively located so as not to affect bats. Light spill should be directed down away from these trees.
Linear navigation features.	Potential fragmentation of bat commuting routes; habitat loss of linear navigation features at all sites.	Retention of these features where possible.
Mixed plantation woodland, hedgerows, trees and scattered scrub.	Potential habitat loss for breeding birds from vegetation clearance at all sites.	New planting to include native species of local provenance, and include fruit bearing species.

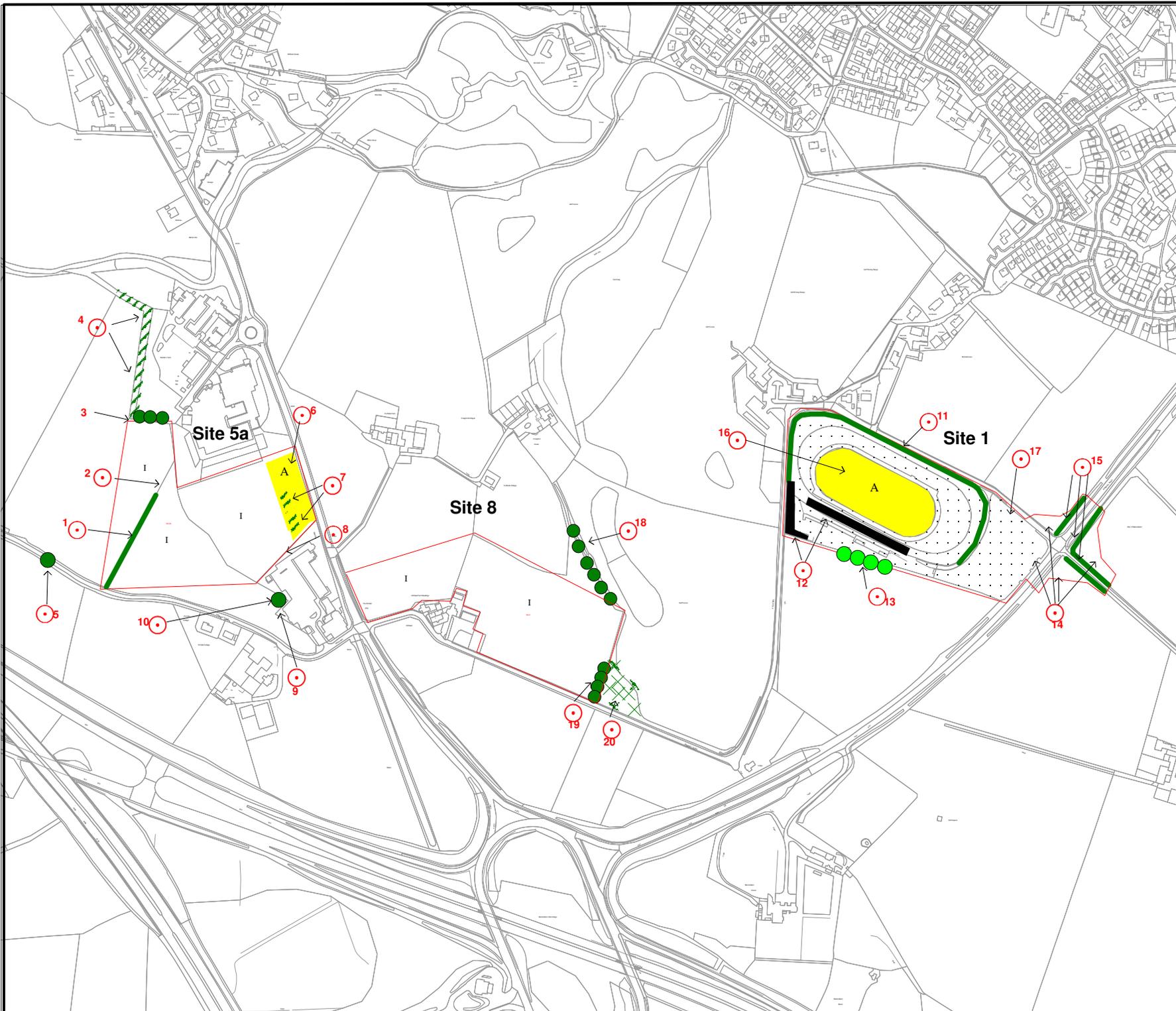
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## Appendix 1 (Figure 1 – Phase 1 Habitat Survey Map)



- ### Legend
- Target Note
  - Site Boundary
  - Standard Conifer Tree
  - Standard Broadleaved Tree
  - Species Poor Hedge
  - A Amenity Grassland
  - Building
  - x Scattered Scrub
  - / Mixed Plantation Woodland
  - . Bare Ground
  - I Improved Grassland
  - SI Poor Semi improved Grassland

Client	Stirling Council
Project	South of Stirling Park and Ride Feasibility Study
Title	Phase 1 Habitat Map
Scale	1:65,000 @ A4
Licence Number: 100037180	

## Appendix 2 (Target Notes)

Target Notes		
Target Note Number	NGR	Description
1	(NS 80059 89366)	Well managed hedge. Hawthorn dominant, with rare holly and ivy.
2	(NS 80094 89434)	Shrub planting. Not yet established. Species comprise hawthorn and dog rose, designed to extend existing hedge.
3	(NS 80076 89505)	Line of semi-mature broadleaved trees. Located upon embankment at north of site. Ash, elder and beech all frequent.
4	(NS 80054 89569)	Two 'push-throughs' under fence into mixed plantation strip. Possibly badger, although not conclusive.
5	(NS 79955 89331)	Mature standard ash tree. Some small cracks and broken limb evident. Medium bat potential.
6	(NS 80257 89437)	Amenity grassland. Well managed with a short sward. Scattered young birch trees planted here.
7	(NS 80265 89371)	Two small mixed plantation copses. Fenced with post and rail fencing. Young to semi mature trees including ash, birch, oak, elder, pine gorse and hawthorn.
8	(NS 80250 89336)	Line of scrub and semi-mature trees. Located between Premier Inn and improved grassland fields. Species include birch, beech larch and laurel.
9	(NS 80242 89285)	Male sparrowhawk. Recorded on ground in scrub.
10	(NS 80250 89277)	Mature standard oak tree. Located on boundary between Premier Inn and improved grassland fields. Rot holes present in tree. Medium bat potential.
11	(NS 81048 89464)	Unmanaged hedgerow. Partially bounds Corbiewood Stadium. Overgrown. Contains mix of native and ornamental species. Frequent bramble and laurel,

Target Notes		
Target Note Number	NGR	Description
		occasional holly, birch and beech.
12	(NS 80983 89365)	Buildings. Kennels and main stadium building. Disused premises attached to main stadium building in poor state of repair. Gaps into loft void evident here. Medium bat potential.
13	(NS 81017 89322)	Line of Leyland Cypress trees. Located on southern boundary.
14	(NS 81249 89382)	Areas of poor semi-improved grassland. Four small areas adjacent to crossroads. Herbs recorded include knapweed, creeping buttercup, clover, cow parsley and mouse ear. Some fly-tipping evident here.
15	(NS 81266 89377)	Hawthorn hedges. Well managed. Located adjacent to poor semi-improved grassland.
16	(NS 81020 89418)	Amenity grassland. Located in centre of race track.
17	(NS 81178 89328)	Bare ground. Comprising of race track, associated roads and parking.
18	(NS 80628 89386)	Line of trees. Species comprise semi-mature ash and oak.
19	(NS 80666 89170)	Line of trees. Species comprise semi-mature ash and oak.
20	(NS 80679 89150)	Small area of scattered scrub. Comprises gorse.

## Appendix 3 – Site Photographs



Photograph 1.  
View from south eastern edge of Site 1.



Photograph 2.  
View from western edge of Site 5A.



Photograph 3.  
View from western edge of Site 8.