

Plymouth Airport Study
Appendix C: Environmental Appraisal

York Aviation
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1 Introduction

1.1 Airport Description

The airport currently comprises two runways. The main runway, 13/31, is situated on a northwest southeast alignment and the second runway, runway 06/24 is situated on a northeast southwest alignment. Runway 06/24 crosses runway 13/31 at the northern end of the airport. Runway 13/31 is set on a gradient of 0.95%, decreasing in height from the north to the south. The airport infrastructure is located to the south of runway 06/24 and the west of runway 13/31. The main surface access route into the runway is from the west.

The main airport infrastructure comprises:

- Main Terminal Building
- Airport Apron (situated between the main terminal building and runway 06/24)
- Maintenance Hangar
- Engine Testing Bay
- Light Aircraft Park
- Fire Station
- Control Tower

Recent developments at the airport include the construction of a 90m RESA at the northern end of runway 13/31. This development was required to meet the safety requirements of the CAA and was facilitated by the realignment of Tavistock Road. However, the presence of the road and other developments in the immediate vicinity of the site mean that future options for expansion to the north are severely limited. The only remaining options for expansion of the airport are to extend runway 13/31 to the south of the airport onto land that is currently occupied by industrial units.

1.2 Airport Expansion

Plymouth is located on the South West Coast of England at the boundary between the Counties of Devon and Cornwall. Due to its location access from other major towns and cities is often difficult. The main road access to the City is via the A38 which links to the M5 Motorway at Exeter, approximately 40 miles north east. Road journeys from Bristol can take up to 3 hours, and trips to London can take 4 hours. Other road links to the City include the A386 from North Devon and a series of minor road from neighbouring towns and villages. Plymouth can also be accessed by rail. Direct journeys to London take approximately 3.5 hours and journey's to Bristol take approximately 2.5 hours.

Air travel has in recent years greatly improved access into and out of the City both in terms of tourism and business. The expansion of the airport will enable Air Southwest to continue providing low fares services to a range of destinations. This will help to improve access into and out of the City for business and tourism which is essential if the City is to realise its vision of turning Plymouth into 'one of Europe's, finest, most vibrant waterfront cities where an outstanding quality of life is enjoyed by everyone'.

1.3 Options for Expansion of the Airport

The purpose of this study is to identify potential environmental constraints which may affect the expansion of Plymouth City Airport and to suggest measures to reduce those constraints. The study has appraised the feasibility of a number of different 'options' that have been identified for the expansion of the airport. For some of the options there are also a number of scenarios that have been taken into consideration.

Four main overarching options have been identified for the expansion of the airport:

1. Retain the airport as at present with no extension, but with or without RESA
2. Construction of a short runway extension and RESA
3. Construction of a long runway extension and RESA
4. Closure of Newquay Airport and construction of a long runway extension and RESA

Environmental Appraisal



2 Air Quality

2.1 Scope of the Assessment

In this chapter, existing air quality in Plymouth generally, and in proximity to the airport are considered. Air quality in the UK is generally dominated by road transport. Local air quality may also be influenced by major industrial operations where they exist. Increasing air travel has raised the profile of airports in relation to their potential for both local and global contributions to pollution generation and greenhouse gas emissions.

2.2 Method

The Air Quality Appraisal has drawn upon discussion with officers of Plymouth City Council and the Air Quality Review and Assessment process undertaken under the terms of Part IV of the Environment Act 1995. Under the Act, all local authorities are required to review air quality in their area and to assess present and likely future air quality against set objectives. If an area is identified as being unlikely to achieve the Air Quality Strategy (AQS) objectives, the local authority is required to designate an Air Quality Management Area (AQMA) and develop an action plan to improve air quality.

The following documents and sources were reviewed:

- Air quality and transport LAQM.G3(00)
- Air quality and land use planning LAQM.G4(00)
- Local Air Quality management Guidance Note LAQM TG(03) 2003.
- Full Review and Assessment of Air Quality in Plymouth 2000
- Updated Screening Assessment May 2003
- Detailed Assessment of Air Quality in Plymouth April 2004
- Assessment of Noise and Air Quality. Plymouth City Airport. Wimtec 1998

2.3 Baseline Desk Study

Plymouth City Council has been monitoring air quality in the City for sometime through a mobile unit and a static site in the City Centre. The Council also operates a diffusion tube monitoring programme for Nitrogen Dioxide (NO₂), the pollutant most readily associated with vehicular traffic. Surveys of NO₂ levels in and around local population centres and major highways have been undertaken. A Full Review and Assessment of air quality was undertaken in 2000, the Updated Screening Assessment issued in 2003 and a Detailed Assessment completed in 2004.

As a result of the Review and Assessment process it has been determined that the levels of common pollutants comply with National Air Quality Objectives in all but three areas. The Updating and Screening Assessment (May 2003) required three pollutants to be examined in more detail, Nitrogen Dioxide, PM₁₀ and Benzene.

The Updating and Screening Assessment (USA) highlighted the following areas of potential concern in Plymouth for traffic related pollution (NO₂)

- Mutley Plain
- Exeter Street,
- Embankment Road and
- Plymouth Road

The USA also identified two areas of concern for fine particles (PM₁₀). These were associated with the unloading of dusty cargoes:

- Victoria Wharves and
- Cattedown Wharf

The USA also required a further examination of Exeter Street Petrol Station, situated on a busy road, with a school within 10 metres of a petrol pump. *Benzene* monitoring was also undertaken around Holy Cross RC School indicated that the objective may be at risk of being exceeded in 2010. As the exposed population are a sensitive group, an Air Quality Management Area was declared.

2.3.1 *Conclusion of the Detailed Assessment*

The conclusions of the detailed assessment (April 2004) are set out below.

Nitrogen Dioxide assessments based on monitoring indicated that the air quality objective is likely to be exceeded Mutley Plain and Exeter Street. Complex atmospheric dispersion modelling indicated that the objectives would be met at all the sites. As a precautionary approach, Air Quality Management Areas have been declared.

PM₁₀

Of the two areas requiring further assessment, PM₁₀ emissions from one site was resolved by changing the products stored at the location so that a detailed assessment was not required. The second location, Victoria Wharves, exceeded the 24-hour mean, but the exceedences were less than the 35 per year stated in the objective in the 6 month monitoring period.

2.4 **Air Quality at the Airport**

The Airport lies alongside the A386 Tavistock Road, a major highway accessing Plymouth from the north.

Historical continuous monitoring carried out by the council over the period December 1993 to January 1994 using a mobile laboratory and diffusion tubes are summarised below.

- 2.4.1 *Ozone*
Average results were 25ppb, well below the UK standard at that time and falling within the DoE "Very Good" air quality criteria.
- 2.4.2 *Sulphur Dioxide*
Measured concentrations were significantly below air quality standards.
- 2.4.3 *Benzene*
Benzene concentrations on Tavistock Road (Aug 1997) were measured at 2.2ppb, well below the UK standard of 5ppb.
- 2.4.4 *Oxides of Nitrogen*
The highest hourly NO₂ concentration measured was 22ppb at the airport and 28ppb on Tavistock Road. This is significantly below the UK standard and within the "Very Good" DoE air quality guideline.

In both the Full Review and Assessment carried out in 2000 and the Updated Screening Assessment published in 2003, neither the airport, or its access route was considered as having the potential to breach air quality standards and objectives. All areas considered as potential Air Quality Management Areas in the Review and Assessment process undertaken by Plymouth City Council to date are located well away from the airport site and its access routes.

Background ambient air concentrations for the area containing the proposed development site were established from the NETCEN website (www.airquality.co.uk). Information on existing background air quality is based on the published and ratified data of the DEFRA Automatic Monitoring Network. Predicted future background concentrations were derived for 2005 and 2010. The data provided in proximity to the airport site (250500, 60500) is displayed below along with the UK Air Quality standards and objectives for the pollutant.

Table 2.1 Predicted background air quality at the Airport (250500, 60500)

Pollutant	2005	2010	Objective	Date to be achieved by
NO _x (µg/m ³)	21.7	17.3	-	-
NO ₂ (µg/m ³)	16.1	13.6	40	31/12/2005
PM ₁₀ (µg/m ³)	16.9	16	40	31/12/2004
Benzene (µg/m ³)	0.35	0.311	5.0	31/12/2010
CO (mg/m ³)	0.18	0.13	10	31/12/2003
1,3 – butadiene (µg/m ³)	0.10	0.08	2.25	31/12/2003

All existing background pollutant concentrations are below the National air quality standards and are predicted to decrease over the next few years.

The limited number of flights to and from the Airport and hence the relatively low number of associated road traffic movements by passengers and staff do not contribute significantly to annual pollutant emissions and local air quality. Changes in flight numbers and increased passenger movements spread out over the normal working day operations are not expected to result in a significant impact on the quantity of air quality pollutant species in the proximity of the airport.

2.5 Assessment of Effects of the Proposed Airport Extension on Air Quality and Climate

2.5.1 Potential Sources of Effect on Air Quality and Climate

The potential sources of effects of the airport expansion options on local air quality and climate include:

- Increased aircraft emissions associated with an increase in flights numbers
- Increased emissions from increased surface access movements
- Generation of dust associated with construction of the embankment for the RESA and runway extension

2.5.2 Assessment of effects on Air Quality and Climate

Table 2.2 summarises the potential effects that the different development options for the airport extension may have on local air quality. The table also recommends possible mitigation measures or further studies that should be implemented to reduce, avoid or offset any adverse effects on air quality.

Table 2.2 Summary of the Potential Effects of the Proposed Airport Expansion Options on Air Quality

Effect	Development Option	Potential Effect and Proposed Mitigation
Increased aircraft emissions associated with an increase in flights numbers	Option 1	<p>There is the potential for a maximum increase in daily flights from 11 to 31. This represents a 280% increase. This will not have any adverse effects on local air quality in and around the airport. The effect on CO₂ emissions will be negligible. This is due to the relatively small number of flights (11,315 per year) compared to other commercial airports (Belfast City Airport has 45,000 flights per year and London City Airport has 73,000 flights per year) and the fact that the aircraft will be restricted to the existing Dash 8 Q300 type, which is a turboprop engine. Turboprop engine aircraft have greater fuel efficiency than jet engines and therefore have lower CO₂ emissions.</p> <p>No mitigation measures will be required.</p>
	Option 2 & 3	<p>The number of aircraft arrivals and departures will depend on whether the passenger demand is low (28 flights), medium (40 flights) or high (48 flights). These amount to increases of 250%, 360% and 440% flights per day, respectively, against the current flight schedule. The relatively low number of flights (17,520 flights per year for high passenger demand) compared to other airports (see figures for Belfast and London City Airports above), and the use of turboprop engine aircraft will minimise emissions of CO₂.</p> <p>The effects on local air quality from the increase in flights will be negligible.</p> <p>No mitigation measure will be required.</p>
	Option 4	<p>There will be up to 50 flights per day (100 movements per day). This amounts to an increase of 450%. This equates to approximately 6 movements (take-off or landing) per hour between 06:30 and 22:30.</p> <p>The effects on local air quality from the increase in flights will be negligible. The relatively low number of flights (36,500 flights per year) compared to other airports (see figures for Belfast and London City Airports above), and the use of turboprop engine aircraft will minimise emissions of CO₂. No mitigation measures will be required.</p>
Increased emissions from increased surface access movements	Options 1, 2, 3 and 4	<p>Construction of the recommended 120m RESA and the runway extension will require the construction on an embankment at the western end of runway 13/31. The construction of the embankment would require approximately 650,000 tonnes of fill material. This fill material will either be sourced externally or will be taken from within the existing airport site.</p> <p>The placement of this fill material will require transfer by road vehicles from source to permanent final locations along agreed and approved routes. It can be expected that some 35,000 deliveries of fill materials will be required during the construction period. With a one year construction period, this would constitute up to 200 HGV movements per day. Given expected traffic flows along existing approach roads, changes in HGV movements along those highways at not expected to change air quality significantly at receptors along those routes.</p> <p>Increased passenger numbers will result in increased traffic movements to and from the airport on existing highways. High passenger forecasts would result in approximately 3500 passenger vehicle movements per day. This increase in road traffic will have the potential to impact on air quality along these traffic routes. The extent of the increase in pollution and its potential impact on local air quality will need to be assessed, particularly in areas of existing congestion and where pollution levels are approaching air quality standards.</p>

Effect	Development Option	Potential Impact and Proposed Mitigation
<p>Generation of dust associated with construction of the embankment for the RESA and runway extension</p>	<p>Options 1, 2, 3 and 4</p>	<p>If fill material has to be imported to the site there will be potential dust emissions from the transportation of the fill material and the construction of the embankment. In windy conditions there is potential for this dust to be dispersed over local land users. Plymouth airport is surrounded by built development in all directions. Land to the immediately to the south and east of the runway and the proposed extension area is occupied by industrial units (Endover Industrial Estate). One of these units includes the Wrigley's factory which is situated approximately 1km from the airport boundary. The processes that are carried out at the Wrigley's factory include the production of food products. These processes are therefore sensitive to air quality as they can be affected by the quality of the air that is filtered into and out of the factory. Depending upon the wind direction, dust emissions associated with construction of the embankment may have a negative effect on local air quality in the immediate vicinity of the factory.</p> <p>Dust from the construction of the embankment may also affect local residential properties that are located to the east and south west of the airport site.</p> <p>It is expected that dust from the construction of the embankment will have negligible effects on Derriford Hospital or the College of St Mark and St John (Majons) or residential properties located to the north of the airport. This is due to the distance between these properties and proposed extension area and the topography of the surrounding area.</p> <p>If fill material is sourced from within the airport site there is potential that Derriford Hospital, the College of St Mark and St John (Majons) and residential properties located to the north of the airport would be also affected by dust. The main source of the dust would be ground movements associated with the removal of fill material within the airport boundary. These effects are in addition to those associated with the construction of the embankment mentioned previously.</p> <p>The construction works will only be temporary. However, it is important that during the construction of the embankment, the importation of fill material or the acquisition of fill from within the airport site, appropriate dust prevention and reduction procedures are enforced. These measures include:</p> <ul style="list-style-type: none"> ■ Wheel washing (HGV and contractor vehicles) ■ Use of covered vehicles to transport materials ■ Damping down fill materials prior to, and during, their movement (construction of the embankment and movement of material from the airport site)

3 Ecology

3.1 Introduction

The following chapter presents the results of an ecological assessment of the different options for the development of Plymouth City Airport. This chapter also contains recommendations for the further survey and assessment work that would be required for each of the development options to be taken forward to a planning application.

3.2 Method

This Ecological Appraisal has drawn on existing information available for the site and broadly follows the Institute of Ecology and Environmental Management's consultation draft *Guidelines for Ecological Impact Assessment*, July 2005. The main tasks have been to:

- Assemble data on the site and its environs, in the form of a baseline study;
- Collate basic information about the scheme;
- Make recommendations for additional survey work that may be required.
- Identify potential ecological impacts by comparing the situation with the proposed options against the baseline conditions;
- Identify possible measures to prevent, control or mitigate significant adverse impacts; and
- Identify any residual impacts with mitigation in place.

The appraisal is divided into two sections:

- A baseline study that provides information on the existing conditions at the site.
- A discussion of the possible impacts that the works may have on the ecological interest and potential compensation and mitigation measures, where appropriate.

3.2.1 Baseline Desk Study

The baseline study for the appraisal comprises a review of desk study research and consultations.

Three prior ecological studies were available to gain an understanding of the current ecological conditions of the site, these were:

Ecological Issues Report - Derriford and Southway Planning Framework, May 2004. Scott Wilson Kirkpatrick & Co. Ltd.

A baseline ecological survey and report, carried out to provide an ecological input to the Area Planning Framework for Derriford and Southway. The extended Phase 1 habitat survey and associated report includes areas within the existing airport site. The authors undertook consultations with local statutory and non-statutory bodies.

County Wildlife Sites Survey 2005 (Plymouth Airport), August 2005. Devon Biodiversity Records Centre.

An ecological survey and evaluation of the local wildlife interest of the Plymouth Airport site was carried out as part of the Devon County Wildlife Sites Survey. The field survey includes detailed botanical information and assesses the wildlife interest against County Wildlife Site criteria (a local designation for sites of county importance for wildlife).

A386 George Junction Improvement Scheme – Environmental Statement, July 2001. Oscar Faber, Exeter

This Environmental Statement reports the environmental impact assessment of the road junction improvement scheme to the north of the airport site. It includes detailed baseline field data for parts of the site and a broad overview of the wider area.

3.2.2 *Consultation*

No detailed consultations have yet been carried out due to the strategic nature of this appraisal. However, the *Ecological Issues Report* undertaken by Scott Wilson in May 2004 included consultation responses from the following statutory and non-statutory bodies:

- English Nature;
- Plymouth City Council;
- Devon Biodiversity Records Centre; and
- Environment Agency.

3.2.3 *Assessment of Impacts*

A number of criteria have become accepted as a means of assessing the nature conservation value of a defined area of land, which are set out in *A Nature Conservation Review* (Ratcliffe, 1977) and include diversity, rarity and naturalness. The nature conservation value of an area of land is usually assessed in terms of:

- International importance (Special Areas of Conservation, Special Protection Areas, Ramsar sites)
- National importance (Sites of Special Scientific Interest, National Nature Reserves)
- Regional/County importance (Local Nature Reserves, Sites of Importance for Nature Conservation, ancient woodlands)
- Local importance (significant ecological features such as old hedges, woodlands, ponds)
- Negligible importance would usually be applied to areas of built development, active mineral extraction, or intensive agricultural land, although, under certain circumstances such areas can support species of ecological importance, e.g. birds or invertebrates

While the above approach is useful in providing a national standard for ecological evaluation and impact assessment, the ranking of interests from high (International scale) to low (Local scale) can have certain disadvantages. Ranking tends to undervalue certain resources that may be of greater value at a local level, a valuation based on criteria recognised by Ratcliffe (1977), e.g. size, community diversity, rarity, naturalness. This runs counter to the aims of the 1992 Rio Convention on Biodiversity, which emphasises the importance of local protection of sites and species of ecological interest and the conservation of genetic diversity in the broader landscape. It is therefore important to stress the importance of local sites, particularly where they may make a contribution to the survival of BAP species or species of conservation concern, e.g. birds on the JNCC Red List.

As precise scheme details are not yet identified and the extended Phase I Habitat survey results identify the requirement for a number of detailed (Phase II) ecological surveys, impacts are only covered descriptively at this stage in the assessment. In the absence of detailed information on the presence of protected and noteworthy species, mitigation and/or compensation has been limited to a broad description at this stage. Potential impacts have been identified during construction, post-construction and in operation.

3.3 Baseline Study

3.3.1 Overview

The baseline study for the review comprises a combination of desk study research and consultations. The baseline study included assessing the following specific subjects:

- Habitats;
- Trees and hedgerows;
- Protected areas;
- Protected species; and
- Invasive species.

3.3.2 Background to the Area

The airport occupies a constrained site, encircled by housing and other development. The airport has occupied the site since approximately 1925. Forming a rough triangular shape the airport perimeter consists of roads on the two northern sides and a complex of buildings to the south. These buildings comprise the airport buildings and infrastructure, Derriford Hospital and the St Mark and St John College campus. The business and warehouse units at Estover Industrial Estate are at the southeast end of the 31/13 runway.

Ongoing development through in-filling has left few open spaces in immediate proximity to the airport, with the majority of those left being managed as amenity grassland and of little ecological value. By virtue of this pattern of development, the airport constitutes one of the larger areas of remaining open space within the immediate locality. Although none of it is publicly accessible it is readily accessible by much wildlife.

3.3.3 Protected Areas

There are no national or international designated sites within the airport complex. However the Plymbridge Lane and Estover Road Site of Special Scientific Interest (SSSI) is situated immediately to the south of Plymbridge Road, opposite Island Farm. This small (0.32 ha) site is designated as it supports the only known wild population of the Plymouth Pear (*Pyrus cordata*) and is thus of national importance and legally protected under the Wildlife & Countryside Act 1981, as amended. The nearest international designated site is the Tamar Estuaries Complex Special Protection Area (SPA), some 3km from the study site. The Bircham Valley Local Nature Reserve (LNR) begins to the south of the College complex.

The Devon Biodiversity Records Centre notes that following their survey in 2005 and as a result of the botanical interest of the site, the airport could be recommended as a County Wildlife Site. This would not occur until February 2006, following a review of all the County's sites. This designation is non-statutory and does not have any legal status. However, County Wildlife Sites are included in the City of Plymouth Local Plan (Adopted 1996) as sites of local importance for nature conservation (SLINCs) under Policy AEV7. Policy AEV7 states that "special regard will be given to the preservation of the scientific or nature conservation value of SLINCs in the determination of development proposals that effect them". Parts of the site may also qualify as Priority Habitat under both the UK and Devon Biodiversity Action Plans.

Several adjacent areas are designated under the Council's Greenscape Area designation. This is a local designation to protect open areas and their associated habitats and species. These sites vary in importance from local to international level. No part of the airport is currently designated, but the effect of a development on adjacent Greenscape Areas has to be considered under Policy 69 of the City of Plymouth Local Plan (1995-2011) First Deposit Version.

3.3.4 *Habitats*

The management of the airport's grassland strips over successive years on a minimum 5 inch cut, combined with the lack of any significant fertiliser applications, has produced a moderately diverse neutral grassland community. However, most of it is determined to be of limited botanical interest. Species listed include Yorkshire fog (*Holcus lanatus*) red fescue (*Festuca rubra*), creeping bent (*Agrostis stolonifera*), crested dog's tail (*Cynosurus cristatus*), bird's foot trefoil (*Lotus corniculatus*) and ribwort plantain (*Plantago lanceolata*). Also abundant were selfheal (*Prunella vulgaris*), common knapweed (*Centaurea nigra*), white clover (*Trifolium repens*) and hedge bedstraw (*Galium mullugo*).

Within the grassland areas are further features that increase the diversity of habitats, these include bare, or sparsely vegetated areas, wetter depressions and earth banks. Parts of the site may constitute habitat of national and Devon Biodiversity Action Plan significance, namely lowland meadow.

Most of the species diversity is found around the perimeter of the site in the areas of tall ruderal vegetation and scrub. These form a strip of varying width. The scrub mainly constitutes bramble (*Rubus fruticosus* agg.) and gorse (*Ulex europaeus* and *Ulex gallii*). There are a few trees, mainly sycamore (*Acer pseudoplatanus*), ash (*Fraxinus excelsior*) and pedunculate oak (*Quercus robur*).

The amenity grassland surrounding neighbouring developments, such as the hospital, college campus and Estover Industrial Estate is regularly cut short and the diversity of grass species is very low.

3.3.5 *Trees and Hedgerows*

Areas of species-rich hedgerow associated with the airport are limited. The fence-line surrounding the airport is kept relatively vegetation-free as a security measure. However there are some areas of relatively species rich and/or mature hedgerows just outside of the perimeter fence, particularly to the south and east of the site.

There are mature hedgerows and associated hedge banks on both sides of the entrance road (Plymbridge Lane). This is in poor condition around the airport entrance but relatively intact further to the west.

The hedgerows and trees provide suitable nesting sites for birds and the mature trees within them provide suitable roost sites for bats. Hedgerows also provide a migration route for wildlife into and around the site and across the wider landscape. It is likely that some or all of the hedgerows will meet the criteria of 'important' under the Hedgerow Regulations 1997. Species-rich hedgerows are also listed in the UK and Devon Biodiversity Action Plans as Priority Habitats.

There is a plot of land between two houses on Tavistock Road to the western end of the site that is under a locally-designated Tree Preservation Order. No other information was available about this plot.

The Devon County Wildlife Sites survey of August 2005 notes that there are a few trees, especially where the airport has been extended. Estover Industrial Estate contains a small number of planted shrubs and trees of limited species composition, some being non-native.

3.3.6 *Protected Species*

In addition to the habitat features, the site supports, or has the potential to support, a number of protected or notable species.

Badgers

Details of badger (*Meles meles*) activities around the site were necessarily restricted within the reports in order to avoid persecution. Whilst there is low potential for badgers living permanently within the airport site boundaries, there remains the potential for badgers from known setts in the local area to use the grassland strips as foraging areas or to have outlier or subsidiary setts close by.

Badgers and their setts are protected under the Protection of Badgers Act 1992. Works affecting or near to a badger sett could require a license from English Nature. Further surveys would be required to determine the location of existing setts and the use of the site by badgers.

Dormice

Suitable dormice (*Muscardinus avellanatus*) habitat has been identified in the local area, mainly to the south of the airport within the broad-leaved woodland of the Bircham Valley LNR. There is a low potential for the scrub and tall ruderal vegetation surrounding the site to support dormice, but further surveys would be required to confirm their absence.

Dormice and their habitat are protected under Schedule 5 of the Wildlife & Countryside Act 1981, as amended, and Schedule 2 of the Conservation (Natural Habitats & c.) Regulations 1994. Dormice are a UK BAP priority species.

Bats

No obvious signs of bat roosts were identified during the recent site visits. However, there remains the potential that some features of the site, for example, buildings, trees, etc., could provide potential for roost locations.

The grasslands and associated features of the airport provide suitable feeding areas and commuting corridors for bats. Consultations with the Devon Bat Group suggest that the site is likely to be used by a variety of species, several of which have been recorded locally, i.e. within 1km of the site. However, no specific details were available.

Bats, their roosts and their habitats are protected by the Wildlife & Countryside Act 1981, as amended and the Conservation (Natural Habitats & c.) Regulations 1994. Further surveys will be required to identify any roost sites, foraging areas and commuting corridors. Whilst bat foraging habitat is not specifically protected under existing legislation, the value of the area for the species would be reflected in the evaluation and impact assessment.

Amphibians

It appears that there are no permanent water features or ponds within the airport site. The areas of standing water are reported likely to be seasonal. The general potential for the majority of the site for amphibians is low. No other information was available.

Reptiles

Neither of the recent surveys recorded reptiles during the site visits; however, common or viviparous lizards (*Lacerta vivipara*) and slow worm (*Anguis fragilis*) are known to occur within the site boundary. Indeed, the park and ride facility built within the previous northern boundary of the airport required the translocation of a reported 130 common lizards. These were released to other locations within the airport site.

Several areas within the airstrip provide good or suitable habitat for reptiles including areas of dense scrub, bare ground and short grassland.

Common lizard, slow worm, grass snake (*Natrix natrix*) and adder (*Vipera berus*) receive partial protection under Part 1, Section 9 of the Wildlife & Countryside Act 1981, as amended. This legislates against the intentional killing and injuring of these species. Destruction of habitat of these species without taking appropriate measures, such that would indirectly result in killing or injuring, could also be considered to be an offence.

Birds

The site is known to provide suitable nesting sites for a number of notable species, including skylark (*Alauda arvensis*), meadow pipit (*Anthus pratensis*) and snipe (*Gallinago gallinago*). It has been stated that between 20-30 pairs of skylark regularly nest on the airstrip each year. Skylark and song thrush (*Turdus philomelos*) (also identified on the site) are on the Red list of the *Birds of Conservation Concern 2002-2007*, having undergone a ≥50% decline in their breeding population over the last 25 years. Meadow pipit and snipe are on the Amber list, having undergone a 25-49% decline in their breeding population over the last 25 years. Skylark and song thrush are UK Biodiversity Action Plan Priority Species,

The hedgerows, scrub and trees also provide suitable nesting sites for birds.

The Wildlife & Countryside Act 1981, as amended, protects all wild birds, their nests and eggs from destruction. Certain species also receive further protection under Schedule 1 of the Act, although no Schedule 1 listed birds are known to be present. Further survey work would be required to determine the importance of some areas of the site as breeding bird habitat.

Invertebrates

Owing to its diverse unimproved extensive grasslands the airport provides a suitable habitat for a wide range of invertebrate species, including many species of butterfly which are declining on a local County level. Those reported locally to the hospital and airport include, purple hairstreak (*Quercusia quercus*), white admiral (*Ladoga camilla*), and dark green fritillary (*Argynnis aglaia*). Silver washed fritillary (*Argynnis paphia*) is also reported within the vicinity of the airport and is listed as a species of conservation concern.

Plants

Identified species of local botanical interest include wall bedstraw (*Galium parisiense*) and corky-fruited water-dropwort (*Oenanthe pimpinelloides*). Both are of limited national distribution and are therefore of some local or regional interest, though neither are legally protected or UK Biodiversity Action Plan Priority Species.

3.3.7

Invasive Species

Japanese knotweed (*Fallopia japonica*) is known to be growing in a clump within the eastern boundary of the site, adjacent to Plymbridge Road. This was observed to have been treated, with partial success, in 2004 and noted again in August 2005.

Japanese knotweed is an invasive species that has become widespread in the wild and causes serious problems by displacing native flora and causing structural damage.

Section 14 of the Wildlife & Countryside Act 1981, as amended, makes it an offence to plant or otherwise cause Japanese knotweed or any other Schedule 9 species to grow in the wild. This could include cutting the plant or roots and disturbing surrounding soil, if not correctly managed. There are strict guidelines for the control of and removal of these species (www.environment-agency.gov.uk).

3.3.8 *Limitations of data*

None of the previous studies surveyed or have details of the Estover Industrial Estate. A walkover survey would be required to gain background information for the site and to gain an understanding of the implications of any demolition or development of the site. Due to health and safety issues associated with an operational airport, a full assessment of the whole of the site was not possible at this stage.

Previous background ecological surveys were not sufficiently detailed to build up an accurate picture of the distribution and status of the nature conservation features within the site but merely indicate their potential presence or absence, given the habitats available. This limits the confidence of the assessment. However, owing to the distribution of the features of the site and its current human uses, it is likely that the surveys carried out to date are robust enough to provide a sufficiently confident appraisal of the broad recent ecological value of the site, excluding the Estover Industrial Estate.

3.4 **Assessment of the Effects of the Proposed Development on Ecology**

3.4.1 *Potential Sources of Effects on Ecology*

The potential sources of effects of the airport expansion options on ecology include:

- Loss of land for the mixed use development
- Construction of the embankment
- Removal of fill material from within the airport site for the construction of the embankment
- Relocation of the Airport Infrastructure

3.4.2 *Assessment of Effects on Ecology*

Table 3.1 below, summarises the potential effects that the different development options for the airport extension may have on ecology. The table also recommends possible mitigation measures or further studies that should be implemented to reduce, avoid or offset any adverse effects on ecology.

Table 3.1 Summary of the Potential Effects of the Proposed Airport Expansion Options on Ecology

Effect	Development Option	Potential Effect and Proposed Mitigation
Loss of land for the mixed use development	Options 1, 2, 3 and 4	<p>To fund construction of the embankment, which is required to enable construction of the RESA and the runway extension, Sutton Harbour holdings will have to sell or lease part of the airport site for alternative development. In line with the requirements of the emerging Plymouth Local Development Framework (LDF) and the associated Derriford/Seaton/Southway Area Action Plan, the land that is leased/ sold would be used for mixed use development (housing, commercial and business).</p> <p>The airport has been identified as containing moderately diverse unimproved grassland habitat that is potentially of County level importance (Devon Biodiversity Records Centre Survey Results). Some of this habitat is located within the proposed mixed use development site (western end of the airport).</p> <p>There is also potential for protected species (slow worms and lizards) to be present within the proposed mixed use development section of airport site.</p> <p>The following mitigation measures have been identified to minimise or avoid any adverse effects on the ecological value of land to the west of the airport site:</p> <ul style="list-style-type: none"> ■ Further survey of the area of moderately diverse unimproved grassland to provide more detail of the species that are present ■ Protected species survey (slow worms and lizards) to identify the need for possible translocation requirements <p>There is potential for the land that will be created with the construction of the RESA and the extension of the runway to be used for habitat creation and the translocation of protected species.</p>
Construction of the embankment	Options 1, 2, 3 and 4	<p>Construction of the RESA and the extension of runway 13/31 would require the construction of an embankment that would extend into the Estover Industrial Estate. The habitat within the Estover Industrial Estate appears to be of low ecological value. Therefore, there is potential that if carefully profiled and re-vegetated the embankment could help to increase the amount of neutral grassland to the south of the runway. This would improve the ecological value of the area.</p> <p>The RESA construction and runway extension would require the removal of a section of hedgerow and hedgebank. The section of hedgerow has been identified as being fairly mature and contains some large trees.</p> <p>A Hedgerow Survey, as required under the Hedgerow Regulations 1997, should be carried out prior to the removal of this hedgerow to check its 'importance'.</p>

Effect	Development Option	Potential Effect and Proposed Mitigation
Removal of fill material from within the airport site	Option 1 (No RESA)	There will be no effects associated with this option
	Options 1, 2, 3 and 4	<p>To reduce the cost of constructing the embankment, and to reduce the need for fill materials to be imported from external sources, there is an option to use fill materials from within the airport site. This would involve the movement of fill material from certain 'higher points' within the site to construct the embankment. The movement of fill materials would result in the loss of habitat and the possible disturbance of species. Once the fill material has been removed, the habitats will be reinstated or recreated.</p> <p>As identified for the mixed use development, the airport contains moderately diverse unimproved grassland habitat which is potentially of County level importance (Devon Biodiversity Records Centre Survey Results). There is also potential for protected species (slow worms and lizards) to be present within the proposed mixed use development section of airport site.</p> <p>The following mitigation measures have been identified to minimise or avoid any adverse effects on habitats and species in areas from which fill would be removed.</p> <ul style="list-style-type: none"> ■ Further survey of the area of moderately diverse unimproved grassland to provide more detail of the species that are present ■ Protected species survey (slow worms and lizards) to identify the need for possible translocation requirements <p>There is potential for the land that will be created with the construction of the RESA and the extension of the runway to be used for habitat creation and the translocation of protected species.</p>
Relocation of the Airport Infrastructure	Options 1, 2, 3 and 4	<p>The relocation of the airport infrastructure will have no long term adverse effects on the ecological value of the airport site as the land that will be occupied by the airport infrastructure is of low ecological value, comprising disturbed ground or tarmac areas.</p> <p>As part of the mitigation for the development of the site it is advised that a protected species survey is carried out due to the potential for the airport site to contain slow worms or lizards.</p>

3.5 Recommended surveys and possible mitigation measures

Mitigation and compensation is likely to be required to prevent contravention of protected species legislation and planning policies. This will apply to reptiles and breeding birds, which are known to inhabit parts of the site. It may also apply to other protected species should subsequent surveys reveal their presence on the site, for example, badgers, dormice, bats and amphibians. The precise mitigation and compensation measures required would depend on the result of these surveys.

Many of the surveys recommended are seasonably dependent, as may be the mitigation and compensation requirements. Surveys for protected and notable species will therefore have to be carried out at the appropriate time of year.

3.5.1 *Grassland habitat*

The loss of semi-improved neutral grassland habitat in the western part of the airport could be compensated, to a degree, by the creation of new areas of diverse neutral grassland to the southeast, as part of the runway expansion proposals. Achieving this would require careful re-profiling and re-vegetation of the new extended runway grassland strips and embankment. This could include suitable grass and seed mixes together with the translocation of suitable sections of grassland habitat from the western part, either through topsoil strips or turfs. Alongside suitable future habitat management measures, this could be implemented to reduce the significance of any long term impact due to grassland habitat loss. Precise details of the potential extent of grassland to be lost and the possible area to be created were not available at the time of writing.

It should be noted, however, that the creation and/or translocation of a habitat is not a simple process and the level of success is not guaranteed. Carried out in isolation from any of the other proposals, a runway extension option could have a positive impact on the extent of grassland habitat locally. If undertaken in combination with the loss of grassland habitat at the west of the airport site, this increase could be viewed as a degree of compensation for the grassland habitat lost, but not mitigation.

The degree of certainty with which suitable habitat compensation and translocation may be achieved is dependent on the technical feasibility, the quantity, the current quality, the timescales available and, most importantly, the level of commitment provided by the developer. Monitoring of the sites post-construction should also be undertaken to assess the success of the habitat creation / translocation.

The timing of the construction phases to allow the creation of a new extended runway and its associated grassland margins, before any development of the western extents of the site for housing could be beneficial in the short-term. This phasing would allow those species that utilise the grassland habitats to colonise any newly created habitat features in the south of the site before or as others are removed at the western edge of the site, as a partial degree of habitat continuity could be provided.

3.5.2 *Hedgerows and trees*

Depending on the importance of any hedgerow to be removed, it is likely that a replacement hedgerow and hedgebank of the same, or greater, degree of importance would be required. These new hedgerows should be planted in close proximity and preferably joining the existing hedges.

Opportunities exist for the creation of new species-rich hedgerows along any new extended airport boundary to the south and these should be included in any plans taken forward. In time, these could re-create 'green' linkages in the landscape and allow wildlife to move along and around both the site and to the wider area.

The proposed mixed development at the west of the site should also incorporate new hedge and tree planting schemes where appropriate.

3.5.3 *Badgers*

No details of badger activity were available and the potential impact on this species is therefore unknown. However, as a precaution woodland/scrub habitat in the vicinity of the proposed works should be searched in more detail to confirm absence.

3.5.4 *Dormice*

There is no evidence to date that dormice are present in the airport site although suitable habitat is reported to exist. The clearance of trees and scrub in the vicinity of the airport could result in dormouse fatalities should they be present. Further surveys will be required to confirm absence.

3.5.5 *Bats*

There is no specific information regarding the use of the site and its features by bats. There is anecdotal evidence however that they are likely to be using the site to some degree. Surveys will be required that are sufficiently detailed to map out how bat species are currently using the site, which species and in what numbers.

As part of the bat surveys it will be necessary to determine whether any of the buildings or any suitable trees are being used as bat roosts before they can be disturbed, demolished or cut down. This includes the Estover Industrial Estate site. The survey results will allow the detailed design of any mitigation and/or compensatory measures required.

3.5.6 *Amphibians*

There is limited information available on the use of the site by amphibians, although the habitat is reported to be of low potential. A search for ponds in the locality able to support breeding amphibians should be undertaken before they can be ruled out.

3.5.7 *Reptiles*

Common lizard and slow worm are known to be present within the airport site and there is a potential for grass snake to be present also. The construction phase poses the highest risk of directly killing or injuring reptiles and mitigation measures will be required.

Parts of the site with suitable habitat require detailed surveys for the presence or absence of reptiles, and their distribution and abundance detailed. This can only be achieved during April to October inclusive. Should reptiles be found within areas to be affected by development, including land proposed as material for fill, a number of mitigation options may be available. Habitat manipulation could be first considered to displace reptiles into adjacent suitable habitat. If this is not appropriate in all situations then translocation might also be considered. The receptor site for translocated reptiles may be on or off the airport site depending on the results of the detailed distribution and abundance surveys.

Habitat improvements may be required at any receptor sites prior to any translocations as well as landowner consent and a commitment to ongoing management of the receptor site. Suitable sites are known to occur in the local area but additional surveys and consultations would be required to confirm these details.

Access to the fringing areas of remaining species-rich grassland by contractor's vehicles would not be permitted unless reptiles were confirmed to be absent or had previously been translocated and excluded through the use of appropriate fencing. Works would have to be monitored by an experienced ecologist, i.e. an ecological clerk of works, and an appropriate site management plan and method statement produced. Monitoring of the reptile population post-construction should also be undertaken to assess the success of translocations.

3.5.8 *Birds*

Depending on the timing and location of works the removal of trees, scrub, hedgerows and grassland habitat could result in the destruction of birds' nests or eggs.

If areas and features of the site supporting ground-nesting birds, including wet areas for snipe, are lost then the site may no longer be able to support as many or any of these birds. Mitigation and/or compensation is likely to be required to prevent or reduce this loss.

Breeding bird surveys will be required to allow the areas used by ground-nesting birds such as skylark, snipe and meadow pipit to be mapped out. As a minimum, nesting sites to be affected by development would have to be avoided during the nesting season as detailed below.

It is recommended that all tree, scrub and hedgerow removal be undertaken outside the bird-nesting season (approximately February-August inclusive). Tree and scrub removal during this period should not be undertaken without a prior assessment carried out by an ecologist, in order to avoid damaging or destroying birds' nests or eggs and contravening the Wildlife and Countryside Act 1981, as amended.

3.5.9 *Invertebrates*

The proposals could result in the loss of a variety of different habitats utilised by invertebrates. In particular it could reduce the extent or diversity of grassland plants for notable butterflies. Mitigation and/or compensation may be required to reduce this loss.

3.5.10 *Plants*

Of the two Devon notables reported, their location is not sufficiently detailed enough to infer the impact of the proposals. Further surveys and greater scheme details would be required to determine the likely impact. Mitigation and/or compensation may be required.

3.5.11 *Invasive species*

Japanese knotweed has not currently been identified within the boundaries of the development options proposed. However, there is an area of Japanese knotweed growth at the north of the airport site. Careful management will be required to avoid the risk of disturbing and potentially spreading the plant and contravening the Wildlife & Countryside Act 1981, as amended.

All material containing seed or plant fragments of Japanese knotweed cannot be regarded as soil or construction material waste and it has to be appropriately disposed of to a landfill site licensed to receive it. An appropriate strategy will need to be developed to ensure any works do not spread this species and if necessary plant matter is disposed of in accordance with relevant legislation.

An update survey will be required to determine the full extent of the area of Japanese knotweed growth.

Summary Table

Table 3.2 below lists Phase II ecological surveys that would potentially be required to comprehensively assess the ecological impact of the scheme. It should be possible to survey for more than one species at a site on a particular day.

Table 3.2 Summary of ecological surveys

Species	Survey	Optimal survey time
Botanical survey	Once more detailed proposals are available, a further survey should be undertaken of the sites in order to provide advice to avoid works impacting on noteworthy or invasive species. A hedgerow survey will be required to determine the importance of the hedgerows using the Hedgerow Regulations 1997 criteria.	Summer
Badgers	A detailed survey should be undertaken to check for the presence of badgers in the vicinity of the works.	Winter
Dormice	A survey of the site for suitable habitat and to check fallen hazel nuts for distinctive dormouse gnaw marks.	Winter
Bats	A survey for features suitable as bat roosts, e.g. holes in trees, crevices in buildings, etc. Dusk bat detector surveys will be required to determine the use of the site by bats and to allow mitigation to be designed.	Summer
Amphibians	Determine whether there are any suitable features for breeding amphibians.	Spring
Reptiles	Undertake habitat survey to determine extent and location of suitable habitat for reptiles. Undertake detailed surveys to determine numbers and species present, required to design mitigation requirements.	Summer, exclusively
Birds	Undertake survey to determine extent and location of suitable habitat for breeding birds. Undertake breeding bird surveys to determine breeding site locations, required to assess impact and design mitigation requirements.	Spring, exclusively
Invertebrates	A local entomologist should be consulted to determine the requirement for an invertebrate survey, in particular assessing the importance of the grassland composition.	Summer

3.6

Planning Issues and Conclusions

In order to fully assess the ecological impact of the proposals a variety of detailed (Phase II) ecological surveys should be undertaken for the habitats and protected and notable species as described in this report. It should be emphasised that many of these species are legally protected and therefore if present appropriate mitigation must be undertaken.

Local policies and plans have been reviewed in relation to the proposed developments. The final conclusions are ultimately dependent on the results of the future surveys, the detailed layout of the site, the locations and extent of the most important nature conservation features of the site and the detailed proposed design, and should be seen in this context.

National and local planning policies are likely to require that new grassland and hedgerow habitats or features be created in order to compensate for those to be lost. In addition, in order to achieve an acceptable planning solution it is possible that the best areas of the site for nature conservation interest may be required to be retained or compensatory measures undertaken. However, it is likely that there are opportunities to achieve these compensatory measures on or in close proximity to the site.

The creation of new or improved habitat areas, in particular 'green' corridor routes and buffer zones between different types of land use, could also serve to minimise the long term impacts on the local biodiversity and landscape caused by the loss of the semi-improved grassland and hedgerow habitats and features and should be included in the final detailed designs.

This study has concentrated on the likely impact of the development proposals in relation to the airport site alone and it should be noted that the cumulative impacts of all proposed neighbouring developments would also need to be considered as each of these options is considered and taken forward.

Table 8.4 Summary of the Potential Effects of the Proposed Airport Expansion Options on Surface Access

Effect	Development Option	Potential Effect and Proposed Mitigation
Generation of traffic during construction of the embankment	Option 1 (No RESA)	There will be no effects associated with this option as there will be no requirement to construct an embankment
	Options 1 (With RESA), 2, 3 and 4	It has been estimated that 650,000 tonnes of fill will be required to extend the runway. If this is sourced from within the airport boundary the wider traffic impact will be minimal although the noise from on-site construction may be an issue. If all of the fill material needs to be imported the traffic flow will be some 32,500 four axle rigid tipper lorries on the assumption that each lorry's payload is 20 tonnes. The total number of lorry movements will be 65,000. Assuming a one year construction period and seven day working this equates to 65,000 divided by 365 equals 200 movements per day. The road network in the area is likely to be able to handle these movements but it would be preferable if they could be avoided. If they are unavoidable careful consideration should be given to minimising environmental impacts by careful routing of construction traffic.
Land take associated with construction of the embankment	Option 1 (No RESA)	There will be no effects associated with this option as there will be no requirement to construct an embankment
	Options 1 (With RESA), 2, 3 and 4	<p>The path connecting Miller Way, Derriford to the Estover Industrial Estate on Plymbridge Road would be severed by any runway extension and, while diversion may be possible, this will involve longer travel distances for pedestrians. An alternative route, which may be suitable as a temporary route during construction, is available through the housing estate and the Estover Industrial Estate. However a more direct route needs to be sought for the permanent diversion.</p> <p>Bus Service 147 which serves Thornbury Road and Estover Industrial Estate from Plymbridge Road will be affected by the runway extension. The loop around Thornbury Road would no longer be possible. The bus service connects to the city centre and Derriford Hospital running at a 30 minute frequency during peak hours between Mondays and Saturdays. No other services are affected.</p>

Effect	Development Option	Potential Effect and Proposed Mitigation
Operation of the Airport	Option 1 (No RESA)	There will be no effects associated with this option as there will be no requirement to construct an embankment
	Options 1 (With RESA), 2, 3 and 4	<p>Extension of the runway and an assumed increase in flight frequency and flight destinations at Plymouth City Airport could potential see an increase in passengers from 170,000 (assumed existing levels) to 589,000 by 2010, and 1,244,000 by 2030. This is the equivalent to a 250% increase and a 630% increase respectively. As a traffic generator the airport is currently modest in comparison to the adjoining Derriford Hospital. Plymouth Hospitals NHS website currently indicates that:</p> <ul style="list-style-type: none"> ■ There are 760 public parking spaces at Derriford Hospital; ■ 25,000 people pass through the front doors of the main Plymouth Hospitals each week (an average of 3,571 per day); ■ At least 25,000 vehicles enter the Derriford Hospital site per week (an average of 3,571 per day). <p>It is possible that with the highest forecast passenger numbers at Plymouth City Airport, the number of car parking spaces required at the airport could approach the existing number at Derriford Hospital. However with a lower turnover of parking spaces at the Airport, trip generation is likely to be lower than the trip generation from the hospital as existing. Even with the high passenger growth figures Plymouth City Airport passenger numbers will remain modest compared to other airports. For example:</p> <ul style="list-style-type: none"> ■ Bristol Airport handled 4.64 million passengers in 2004; ■ Southampton Airport handled 1.53 million passengers in 2004; ■ Exeter Airport handled more than 500,000 passengers in the period April to September 2005. <p>However in the absence of measures to minimise trip generation by motor vehicles, there will be some additional pressure on surface access to the airport. This could increase congestion on the A 386 Tavistock Road with particular problems at the junctions serving the Derriford area. Additional work is required to assess the extent of these problems and how they could be addressed.</p> <p>It would be desirable to improve public transport facilities as this will both improve the attraction of the airport to users and minimise the impacts of traffic on the congested roads in the area, particularly the A386 Tavistock Road Northern Corridor into Plymouth. In the short term this is probably best done by extending the existing bus services serving Derriford Hospital. In the longer term dedicated airport bus services, such as those serving Bristol Airport from Bristol City Centre are an option. The proximity of the airport to Derriford Hospital has the advantage of allowing the Airport to piggy-back on the high quality bus services to the hospital and the disadvantage of the congestion caused by vehicle traffic to and from the hospital.</p> <p>Closure of Runway 06-24 and development of part of this land could provide the opportunity to improve highway access to both the Airport Terminal area and Derriford Hospital from the north west. However this opportunity will be affected by the viability of the development and the effects of maintaining a vehicular route through the development. It may be preferable to limit through traffic to buses and those on foot or cycle. Furthermore in practice the land that can be made available following the closure of Runway 06-24 may be less than that indicated in the <i>Derriford and Southway Area Planning Framework Draft Final Report</i> because of the need to maintain adequate apron area to cope with additional flights. A through route for motor vehicles may not be possible. A route for pedestrians and cyclists should still be</p>

		possible as there is a gap between two of the houses on Tavistock Road that is sufficient for this purpose.
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4 Landscape and Visual

4.1 Introduction

The following chapter looks at the potential effects that the different airport expansion options will have on landscape character and visual amenity. This chapter also identifies opportunities for reducing or avoiding any adverse effects and makes recommendations for landscape enhancement where appropriate.

4.2 Method

The purpose of this study is to undertake a strategic assessment of the different scenarios for the development of Plymouth City Airport. At this stage in the development process only a broad level of detail has been provided for the appraisal of the effects of the scenarios on landscape character and visual amenity. Based on recommendations from this appraisal, further, more detailed landscape and visual assessment may be required later on in the development process.

4.2.1 *Landscape Character Assessment*

The following method was used to establish the baseline and assess the potential effects of the airport extension scenarios on the landscape character of the Airport and surrounding area.

A desk based survey which included:

- A review of local landscape character assessments for Plymouth
- A review of Ordnance Survey maps to get topographical details

A site survey was carried out in October 2005 to establish the current landscape character of the airport and surrounding area.

4.2.2 *Visual Assessment*

A site investigation was undertaken to establish the visual amenity value of the airport and surrounding area, and to identify key visual receptors that would potentially be affected by the different airport extension scenarios. Photographs were taken from key viewpoints.

4.3 Landscape Character Assessment Review

The “landscape is what determines the character of the British countryside” (Countryside Agency website 2005). The Countryside Agency recently published a report into countryside character of England entitled: *The Character of England: Landscape, Wildlife, and Natural Features* (2004). This report includes a systematic description of the features and characteristics of the British landscape.

The countryside surrounding Plymouth is classed as a “South Devon” landscape. The key characteristics of this landscape include: rounded hills; steep intricate valleys; wooded rias, large expanses of tidal mudflats; diverse coastlines; sunken lanes and thatched buildings; settlements in sheltered locations; cliffs and long sandy beaches. Many of these landscape characteristics are not representative of the suburban environment that surrounds Plymouth City Airport. However, Plymouth is specifically mentioned in this character assessment with reference to its outcrops of Devonian Limestone, its excellent natural harbour and maritime historic, and the function of the port as a naval base.

The City of Plymouth is surrounded by designated landscapes. The western boundary of the City is adjacent to the Tamar Valley Area of Outstanding Natural Beauty (AONB) (also a SSSI, SPA and SAC), and the South Devon AONB is situated to the southeast of the City. Dartmoor National Park, which provides a dramatic landscape and recreational resource for residents as well as attracting many tourists, is located to the North East of the City.

The majority of land within Plymouth can be divided into 4 categories. These include either urban, previously developed land or undeveloped, woodland or designated green space. Settlement form varies within the urban areas from the high density City core to the suburban fringes of the City.

4.4 Landscape Baseline Assessment

4.4.1 *The Airport Site*

The airport occupies a constrained site on top of a hill approximately 4km from the City Centre. The airport is characterised by two straight tarmac runways, surrounded by short, maintained grassland. The main runway, runway 13/31 follows a northwest southeast alignment. The second, shorter runway, runway 06/24, has a northeast southwest alignment. The airport infrastructure, which comprises a low level terminal building, the control tower, airport apron area, two aircraft hangars and an engine testing bay, is located to the south of runway 06/24 and the west of runway 13/31. The main surface access route into the airport is from the west.

Situated on top of a hill the airport site contains a slight gradient which decreases from north to south. There is also an additional decrease in height from east to west. This is most defined in the southern section of the airport where the land drops steeply away from the airport perimeter into the surrounding housing area and Estover Industrial Estate.

The airport is surrounded by a 3m high mesh wire safety fence. Emergency access gates are positioned at regular intervals along the eastern and north western perimeters where there is direct access onto the main road network.

In addition to the wire mesh fencing, part of the airport boundary is aligned with combinations of screen planting and areas of scrub regeneration. This is most prominent along the western and southern boundaries of the Airport

4.4.2 *Immediate Surrounding Area*

The airport is surrounded in all directions by housing and other forms of built development, including roads. The A386 Tavistock Road runs along the northwest boundary of the airport site towards its junction with the B3432 which runs north south along the eastern site boundary. A park and ride site is currently being constructed on land to the immediate adjacent to the A386 B3432 junction.

The surrounding built development has a piecemeal character, comprising a mixture of new and old housing developments, new and old transport infrastructure (Park and Ride, New Tavistock Road and the older B3432), Derriford Hospital, the Estover Industrial Estate and St John and St Marks College. The proximity of the built development to airport gives the site a distinctly urban-fringe feel.

Housing to the north of the airport site, adjacent to the new park and ride comprises a mixture of new and 1970s to 1990's style housing. The housing flanking the eastern airport boundary is interspersed with the occasional area of public open space. This area of housing extends east and down hill into the neighbouring wooded valley.

The southeast and southern boundaries of the airport are surrounded by industrial development including the Estover Industrial Estate. Again, as with the housing, the quality and age of the industrial buildings is variable with abandoned units situated amongst new, well maintained and active units.

There is a recent (late 1990's to early 2000) area of housing located southwest of the airport. Most properties are situated on sloping lower ground than the airport. The college of St John and St Mark is situated immediately to the south of the main airport terminal buildings. The collage comprises a number of different buildings including student accommodation. The grounds also contain a number of areas of green open space and car parking areas. There is a large tennis and sports club located on land immediately adjacent to the college. The structure, a large, modern facility is not in keeping with the character of the collage buildings.

Derriford hospital is located south east of the western most part of the airport. The hospital is characterised by 1950's to 1960's buildings. The hospital is separated from the college and neighbouring housing at southern end of the airport by a swath of public open space that has a wooded perimeter.

Both Derriford hospital and the airport are accessed off the Derriford roundabout, located to the west of the airport. From Derriford roundabout, the new Tavistock Road runs northeast along the northern edge of the airport.

There are a series of large semi detached houses located along the old Tavistock Road (currently situated between the airport boundary and the New Tavistock Road). The houses back gardens abut immediately onto the adjacent airport land. Some gardens have direct access onto the airport where the fencing has been removed or is absent.

There are extensive areas of new and old housing areas located to the north of the New Tavistock Road. These extend northwards into the adjacent wooded valley.

4.5 Assessment of Effects on of the Proposed Development on Landscape Character

4.5.1 Potential Sources of Effects on Landscape Character

The potential sources of effects of the airport expansion options on surface access include:

- Construction and presence of the embankment and runway extension
- New housing / Mixed use development
- Change or increase to the airport infrastructure
- Increased aircraft activity with the airport
- Changes to on site topography due to the removal and redistribution of fill material.

4.5.2 Assessment of Effects on Landscape Character

Table 4.1 below, summarises the potential effects that the different development options for the airport extension may have on landscape character. The table also recommends possible mitigation measures or further studies that should be implemented to reduce, avoid or offset any adverse effects on landscape character.

Table 4.1 Summary of the Potential Effects of the Proposed Airport Expansion Options on Landscape Character

Effect	Development Option	Potential Effect and Proposed Mitigation
Construction of the embankment	Option 1 (No RESA)	There will be no effects associated with this option
	Options 1 (With RESA), 2, 3 and 4	<p>Plymouth Airport is situated on top of a hill. As a result of this the Estover Industrial Estate, and adjacent housing, to the southwest of the main runway (13/31) is situated on lower lying ground. To facilitate the construction of the RESA (option 2) and the airport extension (options 3 and 4) an embankment is required to raise the height of the land immediately to the southwest of the airport to make it level with the existing runway. Land within the Estover Industrial Estate is relatively level. The effect on the landscape of the embankment would be to alter the existing topography of the area with a man made feature. The embankment will be unusual feature within an area that is fairly well developed with a mixture of industrial and other built development. Due to the predominantly industrial character of the landscape immediately southwest of the airport the construction, of the embankment will only have minimal adverse effects on landscape character.</p> <p>Opportunities for landscaping (e.g. structure planting or similar) at the base of the embankment, and the surrounding area, should be incorporated into the design of the embankment to soften its appearance.</p>
Remove of fill materials from within the Airport for use in constructing the embankment	Options 1 (No RESA)	There will be no effects as there will be no embankment required for this option
	Options 1 (With RESA), 2, 3 and 4	<p>To reduce the cost of constructing the embankment, and to reduce the need for fill materials to be imported from external sources, there is an option to use fill materials from within the airport site. This would involve the movement of fill material from certain 'higher points' within the site to construct the embankment. The movement of fill materials would alter the topography of land within the airport site. As identified in the baseline description, the landscape within the airport is very uniform and is dominated by the runways and surrounding maintained grassland. Although there are variations in land height within the airport site these do not contribute much to the overall landscape character of the airport. Therefore their removal (levelling) will not have any adverse effects on landscape character.</p>
Mixed Use Development	Options 1, 2, 3 and 4	<p>The presence of mixed use development will alter the character of the airport as it will be a change in use from airport to housing, commercial and business development. Whilst this type of development is generally not in keeping with the typical characteristics of the airport, it is in keeping with the surrounding landscape, which is dominated by areas of new housing to the north, and by a leisure centre, Derriford Hospital, St Mark and St John's college (Marjons) and business offices, to the south. The housing will also be adjacent to the main Tavistock Road which links the surrounding residential areas of outer Plymouth, to the City Centre.</p> <p>A landscape assessment should be undertaken to ensure that the mixed use development does not have adverse effects on the landscape character of the airport or the surrounding area. The development should also be designed to a high quality and be in keeping with the surrounding land uses. Opportunities to incorporate focal points or features of local distinctiveness could be investigated.</p>

Effect	Development Option	Potential Effect and Proposed Mitigation
Relocation of the Airport Infrastructure	Option 1	There will be no effects as there will be no requirement to relocate the airport infrastructure for option 1
	Options 2, 3 and 4	The relocation of the airport infrastructure will change the appearance of the airport but the effects on the landscape character will be minimal. To ensure that the airport does not give rise to any adverse effects on landscape character, new airport infrastructure should be designed to a high quality and be in keeping with existing airport infrastructure and buildings/structures in the surrounding area.

4.6 Visual Amenity Baseline

Visual assessment considers how the different options for the expansion of the airport will affect the visual amenity of sensitive receptors.

This overview assessment has identified that the key visual receptors affected by the airport are local residents. There are a number of properties with views over or into the airport. The most direct open views are from the back windows of the properties along Old Tavistock road, to the north of the site.

Views from properties located to the southwest of the airport are partially screened by the screen planting located along the southern boundary of the airport and the local topography (houses are situated on lower ground than the airport). However, there may be some views from upper storey windows. There are very few views of the airport from the industrial units to the south of the site. Again most views are restricted by the local topography and screen planting. The only visual evidence of the airport from certain parts of the industrial unit is the landing lights.

The views from properties along the eastern edge of the airport increase to the north where the surrounding land height increases so that adjacent houses are level with the airport land. Views from properties to the north of the airport are partially screened by the Park and Ride site, the main Tavistock Road, local topography (land slopes down to the north) and screen planting.

Most structures with the airport are low lying. The most prominent feature is the control tower which has a height of approximately 18m. The terminal buildings have two levels only. Other features within the site include the maintenance hangar which is approximately 12m in height and the aircrafts.

Although situated on high ground, the relatively low lying structures associated with the airport and the surrounding built development, limit most long distance views of the airport. The landing lights are located within the industrial area and therefore not visible to sensitive receptors. There are no footpaths within or adjacent to the airport. Therefore there will be no views of the airport from recreational users.

Views from Derriford Hospital are screened by the neighbouring St Johns and St Marks College and the adjacent woodland planting. Views are also partially restricted by the tennis and sports centre. Fleeting views of the airport may be possible from people travelling along the new Tavistock Road, although these will be short term and limited as they will not be in the main line of site as the direction of travel is parallel to the airport as opposed to towards it. Any views from the Park and Ride site will also be short term.

4.7 Assessment of Effects on of the Proposed Development on Visual Amenity

4.7.1 *Potential Sources of Effects on Visual Amenity*

The potential sources of effects of the airport expansion options on surface access include:

- Construction and presence of the embankment and runway extension
- Removal of fill from within the airport for the construction of the embankment
- Construction and presence of the housing / mixed development
- Relocation and development of the airport infrastructure

4.7.2 *Assessment of Effects on Visual Amenity*

Table 4.2 below, summarises the potential effects that the different development options for the airport extension may have on visual amenity. The table also recommends possible mitigation measures or further studies that should be implemented to reduce, avoid or offset any adverse effects on visual amenity.

Table 4.2 Summary of the Potential Effects of the Proposed Airport Expansion Options on Visual Amenity

Effect	Development Option	Potential Effect and Proposed Mitigation
Construction of the embankment	Option 1 (No RESA)	There will be no effects associated with this option
	Options 1 (With RESA), 2, 3 and 4	<p>Plymouth Airport is situated on top of a hill. As a result of this the Estover Industrial Estate, and adjacent housing, to the southwest of the main runway (13/31) is situated on lower lying ground. To facilitate the construction of the RESA (option 2) and the airport extension (options 3 and 4) an embankment is required to raise the height of the land immediately to the southwest of the airport to make it level with the existing runway.</p> <p>The main views of the southeastern end of the airport and runway 13/31 are from users of the Estover Industrial Estate, users of Plybridge Road and from properties along the northern and eastern periphery of the Estover Residential Estate. When viewed from the residential properties in the Estover housing estate the southeastern end of the airport appears as a vegetated bank/slope. The only visual evidence of the airport from the southeast is the airport landing lights which are located within the Estover Industrial Estate.</p> <p>The embankment would extend south eastwards into the Estover Industrial Estate. This will extend the proportion of airport boundary that is visible from the Estover Industrial Estate, Estover Residential Area and Plybridge Road. It is expected that construction of the embankment will have negative effects on views from these receptors. However, these effects will only be temporary. Although the airport boundary will be extended southeasterly, it will only be the embankment that is visible from these locations due to the landform.</p> <p>To ensure that the long term effect of the extension on views from receptors located to the southeast of the airport are minimal. Opportunities for landscaping (e.g. structure planting or similar) at the base of the embankment, and the surrounding area, should be incorporated into its design to soften its appearance and to screen views from adjacent properties.</p>
Remove of fill materials from within the Airport for use in constructing the embankment	Options 1 (No RESA)	There will be no effects as there will be no embankment required for this option
	Options 1 (With RESA), 2, 3 and 4	<p>To reduce the cost of constructing the embankment, and to reduce the need for fill materials to be imported from external sources, there is an option to use fill materials from within the airport site. This would involve the movement of fill material from certain 'higher points' within the site to construct the embankment. There are direct views into the airport site from the rear of properties located along Tavistock Road. Some of these views are open depending upon the type of boundary at the end of the gardens of these properties. These views are unlikely to be affected by a change in ground levels within the airport site as the land to the west of the airport is relatively flat and will not provide much fill material.</p> <p>Other views into the airport site are from properties located along Plybridge Road which runs along the eastern perimeter of the airport. As a result of the local landform, which decreases in height in all directions from the airport, these properties are set on a slightly lower gradient. The majority of direct views into the airport from these properties are therefore restricted to upper storey windows. There are also views into the airport site from student accommodation associated with Majon College which is located along the western site boundary and adjacent</p>

		residential properties. Again, due to landform, most views into the airport from the residential properties are restricted to upper storey windows. There is potential that the removal of fill material will reduce the height of the land within the airport site. As a result of this change in landform, direct, open views into the airport from properties along the eastern and western perimeter may be increased to lower story windows as the current difference in land height which provides a natural screen is reduced. An increase in open views across the airport may have a negative effect on local residents by increasing the visibility of the airport operations and aircraft. Screen planting may be required to reduce adverse effects.
Effect	Development Option	Potential Effect and Proposed Mitigation
Mixed Use Development	Options 1, 2, 3 and 4	<p>The mixed use development will be located on the area of open grassland to the west of runway 06/24. There are currently direct views across this part of the airport from the rear of properties located along Tavistock Road. The openness of these views varies according to the types of boundary located at the end of the gardens.</p> <p>The proposed mixed use development will be directly visible from the rear of these properties (both lower and upper storeys). There is potential that the mixed use development will intrude significantly on the current views from these properties.</p> <p>The following mitigation measures would be required to reduce the effects of the mixed use development on views from the properties along Tavistock Road:</p> <ul style="list-style-type: none"> ■ Detailed visual assessment of the proposed mixed use development ■ Incorporation of screening into the design of the mixed use development e.g. screen planting between the properties on Tavistock Road on the development ■ Development design to be sensitive to the properties along Tavistock Road e.g. minimise any reductions in privacy associated with the development of adjacent properties ■ Ensure that the mixed use development is designed to a high quality and will be in keeping with the surrounding land uses
Relocation of the Airport Infrastructure	Options 1, 2, 3 and 4	<p>The relocation of the airport infrastructure will change the appearance of the airport. However, the changes in terms of overall visual amenity will be minimal as the majority of the larger structures will be retained in their current position. The aircraft hanger will be repositioned but its new location will not affect the view from any of the sensitive visual receptors (residential areas) surrounding the site.</p> <p>By ensuring that the new airport infrastructure is designed to a high quality and is in keeping with existing airport infrastructure and buildings/structures in the surrounding area, adverse effects on local visual amenity will be minimised.</p>

5 Water Environment and Drainage

5.1 Scope of the Assessment

The following chapter looks at the potential effects that the proposed options for the expansion of the airport will have on the water environment. This chapter also identifies opportunities for reducing or avoiding adverse effects and makes recommendations for improving water quality where appropriate. The baseline section provides information on surface water (mainly rivers), groundwater and describes details of the existing drainage network at Plymouth City Airport.

5.2 Baseline Methodology

A desk study was undertaken into the water environment and Airport drainage. The desk-study identified any attributes of the water environment within the study area and that may be affected by the proposed scheme. Information on the water environment (e.g. watercourses, and groundwater) was obtained from the Environment Agency's (EA) website via the "What's in your back yard?" facility. Details of the drainage network at Plymouth City Airport were obtained from Sutton Harbour plc.

5.3 Baseline

There are several minor, unnamed watercourses located within 500m of the airport perimeter. Those located to the northeast of the airport drain in an easterly direction from the site towards the River Plym, passing through West Wood, Holt Wood, Darklake Wood and Common Wood.

To the south of Derriford Hospital, several minor watercourses drain in a southerly direction through Tamar Science Park and Seaton Business Park. These watercourses were involved in several minor pollution incidents in the 1990's, but none have occurred recently.

Other areas of consideration for this baseline include:

5.3.1 The River Plym

The River Plym flows to the east of Plymouth City Airport in a north to south direction. It is designated as a main river by the EA who monitors it for chemical and biological water quality, expressing the results in terms of General Quality Assessments (GQA). Table 5.1, below, summarises the most recent results of this monitoring for three stretches of the River Plym that are within the vicinity of the Airport.

Table 5.1 Chemical and Biological GQA for the River Plym

River Stretch	National Grid Reference	Chemical Grade	GQA	Biological Grade	GQA	Monitoring Period	Distance from Airport (Km)
Shaugh Bridge – Bickleigh	252700,61810 to 252370,58670	Grade A (Excellent)				1999-2002	>3Km
				Grade B (Very Good)		2002	
				Grade A (Excellent)		2000	
Bickleigh – Plym Bridge	253350,63680 to 252700,61810	Grade A (Excellent)				1999-2002	~1.25Km
				Grade B (Very Good)		2002	
				Grade A (Excellent)		2000	
Plym Bridge – Normal Tidal Limit	252370,58670 to 251760,57100	Grade A (Excellent)				1999-2002	~1.5Km
				Grade B (Very Good)		2002	
				Grade A (Excellent)		2000	

The EA last monitored the River Plym for chemical water quality between 1999 and 2002. Along all three stretches the chemical water quality was Grade A (Excellent). Biological water

quality can be assessed during a single year and all three stretches follow a similar pattern. The Biological GQA for the River Plym at these sites has deteriorated slightly from Grade A (Excellent) in 2000 to Grade B (Very Good) in 2002.

Currently, any surface water that accumulates on Plymouth City Airport drains freely into the ground with pollution control in specific locations where pollutants may mix with surface water. From this point on, the destination of surface water run-off is undetermined. However, given that the River Plym is more than 1km from the Airport it is very unlikely that there is any direct run-off from the site into this watercourse. However, surface water run-off may find its way indirectly into the River Plym following numerous smaller watercourses that drain to it from east and south of the Airport. Water from the airport may also find its way to the River Plym via the groundwater aquifer that is located beneath the site.

The Water Framework Directive 2000/60/EC was transposed by the UK Government in December 2003 with the publication of The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003. The River Plym was described as (under WFD criteria) "a mid altitude, medium catchment with siliceous geology" water body. It has been provisionally classed as a heavily modified water body (HMWB) and is "at risk" of failing to meet the objectives set out under this new legislation.

5.3.2 *Other unnamed local watercourses*

There are three "Leats" (artificial drainage ditches) in Plymouth of which two have some significance with regards to Plymouth City Airport. The oldest Leat in Plymouth dates back to the 16th century and they have more importance in terms of their cultural heritage value than as a watercourse being often dry. The Plymouth Leat drains from north of Tavistock Road away from Plymouth City Airport following the contours of the land. No drainage from the Airport is intended to be released into the Leat at any time. However, it may be necessary to consider the historical watercourse in terms of a risk of spillage entering the system.

5.3.3 *Groundwater*

The EA website provides details of the location of Source Protection Zones (SPZ). No SPZs were identified within the study area.

The Airport lies on an area of groundwater vulnerability. The underlying substrate is a minor aquifer (at NGR 250230 60230) with rocks vulnerable to fracture. In addition, overlying soils have a high leaching potential. Therefore, any pollutants currently lying dormant in the soil may be readily leached out by percolating surface run-off and transported to contaminate underlying groundwater.

5.3.4 *Water Abstractions*

Local water abstractions are a matter of concern to any proposed development with the potential to adversely impact the water environment. The water quality of the source must be maintained for the purposes of their use. On the other hand, water abstractions can exacerbate a pollution incident by reducing the available water for dilution of a spill.

Water is abstracted from the groundwater at 4 locations within 1000m of Plymouth City Airport. Major users are Derriford Hospital and Wrigley Co. Ltd. Any proposed development at the Airport will need to ensure that the quality of these water supplies is not adversely affected.

5.3.5 *Pollution Incidents*

In October 2004 a large oil spill from the Darklake View Industrial Estate, located approximately 200m to the east of the Airport, resulted in the nearby Glenholt Tributary being polluted. The spill was classed as a Category 2 (meaning a “significant incident”) by the EA and involved the release of oil (oils and organic chemicals-solvent based) into the nearby watercourse.

5.3.6 *Plymouth City Airport Drainage Network*

Sutton Harbour Holdings plc. were contacted for information relating to Plymouth City Airport’s drainage network. The following information on the current drainage network was available:

- Oil interceptors have been incorporated into Plymouth City Airport’s drainage network on all areas where surface run-off is likely to contain contaminants. This includes the airports apron areas, around refuelling pumps and the fire training ground.
- All fuel is stored in accordance with the current Environment Agency Pollution Prevention Guidelines (PPGs) including PPG 2 – Above Ground Storage Tanks and PPG 8 – Safe storage and disposal of used oils. These guidance documents contain measures such as bunds around fuel tanks. The Airports fuel storage facilities are regularly audited. Excess fuel in the hangar is collected in drums and disposed of appropriately by the engineers.
- Currently, fuel collected by oil interceptors is allowed to evaporate. However, in the event of a large spill oil interceptors may be pumped clear by a specialist external company. Only minor fuel leaks and small scale spillages have occurred on site and were dealt with appropriately. When small fuel leaks occur on the apron they are washed down to the fire section where oil interceptors collect the spill.
- Due to the mild climate aircraft de-icer is not used at the airport. A biodegradable de-icer is used occasionally to remove ice from the runway. Due to the nature of the substance it is unlikely that this will have any adverse effects on water quality.

5.4 **Assessment of Effects on of the Proposed Development on Water Quality**

5.4.1 *Potential Sources of Effects on Water Quality*

The potential sources of effects of the airport expansion options on surface access include:

- Increased aircraft movements and airport ground operations
- Construction of the RSEA and/or runway extension and associated embankment
- Construction and presence of the housing / mixed development
- Relocation and development of the airport infrastructure

5.4.2 *Assessment of Effects on Water Quality*

Table 5.2 summarises the potential effects that the different development options for the airport extension may have on water quality. The table also recommends possible mitigation measures or further studies that should be implemented to reduce, avoid or offset any adverse effects on water quality.

Table 5.2 Summary of the Potential Effects of the Proposed Airport Expansion Options on Water Quality

Effect	Development Option	Potential Impact and Proposed Mitigation
<p>Increased aircraft movements and airport ground operations.</p>	<p>Options 1, 2, 3 and 4</p>	<p>There is potential for an increase in aircraft movements and airport ground operations to effect surface and groundwater quality by increasing the potential for contaminated surface water runoff and increasing the risk of accidental spillages.</p> <p>Several minor watercourses drain radially away and downhill from the Airport towards the River Plym in the east and the Tamar-Tavy complex in the west. Currently, surface water drains freely to ground via petrol and oil interceptors.</p> <p>Of the main hazardous chemicals that may be found at airports, those that may potentially have an adverse impact on the water environment include petroleum fuels, oils, de-icants and herbicides. Of these, it is possible that the options of the proposed scheme may increase the risk of spillages of fuels and the use of de-icants due to an increase in aircraft movements and Airport surface operations.</p> <p>Airport’s store petroleum on site for ground service vehicles (petrol/diesel) and aircraft (kerosene). Petroleum spillages may occur by accident or during aircraft refuelling, from aircraft standing or movements, and from poor maintenance of storage facilities. Other chemicals (e.g. lubricating oil and hydraulic fluids) are also kept on site but in lesser quantities constituting a lower risk. Petroleum products are a complex mixture of hydrocarbons that are potentially damaging to the water environment and hazardous to aquatic life. During a spill, hydrocarbon compounds may form a film across the surface of water bodies and exert a biochemical oxygen demand (BOD). A relatively small spill has the potential to cover a large surface area causing widespread adverse impacts. Oils also have the ability to bind to the surface of sediments, substrates, and aquatic organisms making it difficult to remove. An expansion of the Airport will increase the number of flights, possibly by larger aircraft and a greater number of aircraft will require refuelling and servicing. This increase in ground activity will heighten the risk of an accidental spillages occurring. Petrol interceptors are currently fitted around the Airport. These will also be required for any new sections of runway or apron to prevent any adverse impact on water from an accidental spillage. It will also be necessary to refer to the Environment Agency’s (EA) Pollution Prevention Guidance 2 – Above ground oil storage tanks (PPG2); and PPG 8 – Safe storage and disposal of used oils.</p> <p>De-icers are used to prevent the formation of ice, frost or snow from vulnerable hard surfaces and aircraft, to enable the safe movement of aircraft, vehicles and pedestrians. Conventional de-icers are not appropriate for aircraft and airports because they are too corrosive and “glycol” based products are more common. Despite being biodegradable, de-icers are hazardous to aquatic fauna and flora in high concentrations and may exert a large BOD and chemical oxygen demand (COD) on local watercourses, resulting in adverse effects.</p> <p>Due to the mild maritime climate at Plymouth Airport there is no requirement for the use of aircraft de-icers and the use of de-icers on the runway is very limited. The de-icer product used on the runway is a biodegradable product. The most common form of biodegradable de-icer is Glycol based. These are soluble and will therefore pass unmitigated through oil interceptors, draining into the ground along with percolating surface water runoff. It is possible that although not protected, groundwater may be the partial source of several minor watercourses draining away from the Airport. There is a possibility that if pollutants from the Airport reach these watercourses via this</p>

		pathway they may cause adverse impacts. Despite this, the use of de-icant at the Airport is unlikely to increase by much following the development of the RESA extension, apron and runway areas, and impacts to local watercourses are therefore expected to be negligible.
Effect	Development Option	Potential Impact and Proposed Mitigation
Construction of new RESA and/or runway extension and embankment	Option 1 (No RESA)	There will be no effect as there will be no requirement for construction of an embankment
	Options 1 (with RESA), 2, 3 and 4	<p>During the construction phase the works may have the potential to adversely impact surface and groundwater quality because of the following main generic impacts:</p> <ul style="list-style-type: none"> - Contamination from accidents or spillages of, for example fuel, oil or materials used during construction; - Removal of vegetation and handling of soils and fill materials could result in sediment being washed into nearby watercourses; <p>There may be a slight risk of accidental spillage occurring during the construction phase from Heavy Goods Vehicle (HGV) movements and other heavy plant. Provided that the Environment Agency PPGs 1, 6 and 21 are carefully referred to and appropriate measures identified in a Construction Environmental Management Plan (CEMP) are adopted before commencement of any works, it is unlikely that there will be any impact to surface water quality.</p> <p>Construction works have the potential to disturb and release large quantities of sediment from a variety of activities including ground excavation, and the movement of fill materials. There is potential for this sediment to be carried away as a “sediment rich” flow once mixed with surface water runoff. In the case of this particular development 650,000 tonnes of fill will be required for construction of the runway extension embankment. Despite the potential for the release of large quantities of sediment from the proposed construction works, surface watercourses are unlikely to be effected by sediment rich runoff due to the location of the works relative to the nearest watercourses. However, it is recommended that any construction works are undertaken in accordance with good practice following standard guidelines including:</p> <ul style="list-style-type: none"> ■ PPG1 – Prevention of pollution controlled waters; ■ PPG3 – Use and design of oil separators in surface water drainage systems; ■ PPG5 – Works in, near or liable to affect watercourses; ■ PPG6 – Working at construction and demolition sites. ■ PPG21 – Pollution incidence response planning.
Relocation of Airport infrastructure	Options 1, 2, 3 and 4	The Airport’s hangers and engine testing area are potential sources of pollutants e.g. hydrocarbons and fire fighting foam. To facilitate the mixed use development the aircraft hanger will be relocated. The construction of a new hanger will require appropriate drainage containment measures to ensure that surface and groundwater is protected from any potential contamination. There will be no impacts from the fire testing areas as this will not be relocated.

Effect	Development Option	Potential Impact and Proposed Mitigation
Construction of mixed use development	Option 1	There will be no effect as there will be no mixed use development.
	Options 2, 3 and 4	<p>There is potential for earth movements and construction activities to lead to increased sediment loading in surface water runoff. However, the effects of increased surface water runoff sediment loads on surface water bodies will be negligible due to the location of the mixed used development site in relation to the nearest surface water bodies and the fact that most surface water from the airport land drains freely into the ground.</p> <p>During construction of the mixed use development, there is the potential for spillages of hazardous substances to occur. It is unlikely that any accidental spillage of a potentially damaging substance from the construction works will impact upon surface watercourses due to the location of the development, but soluble pollutants e.g. thinners, paints, preservatives, acids and weed killers may enter groundwater stores and impact groundwater fed streams.</p> <p>Appropriate mitigation measures should be identified to protect local groundwater quality and outlined in a CEMP and put in place before commencement of any works. There is also the risk that groundwater may act as a pathway for pollutants to several minor watercourses and further investigation may be required. Appropriate guidance should be followed during construction as outline in the EA's PPG documents listed earlier.</p>

6 Flood Risk

6.1 Scope of the Assessment

The following chapter presents a baseline summary of the risk of flooding in the vicinity of Plymouth City Airport. The baseline has been constructed from information obtained from the Environment Agency's (EA) flood map accessed online. This report intends to inform discussions with appropriate consultees as to whether a Flood Risk Assessment (FRA) for the proposed development will be required. The potential flood risk on site and at downstream locations has been assessed and recommendations made to mitigate any adverse effects.

6.2 Flood Risk

Flooding can result from a wide range of events and processes, occurring naturally or as a result of human interference with natural processes. Flooding becomes a problem only when it has an adverse impact on people, property, infrastructure or the environment. CIRIA Report C624 – Development and Flood Risk – Guidance for the construction industry defines flood risk as *“a combination of the probability of a flood hazard occurring and the magnitude of the potential consequences of a flood.”* The probability of a flood hazard *“can be described as the chance that it will happen in any one year”* and the *“consequence of flooding will depend on the nature of the flood hazard and the vulnerability of an area.”*

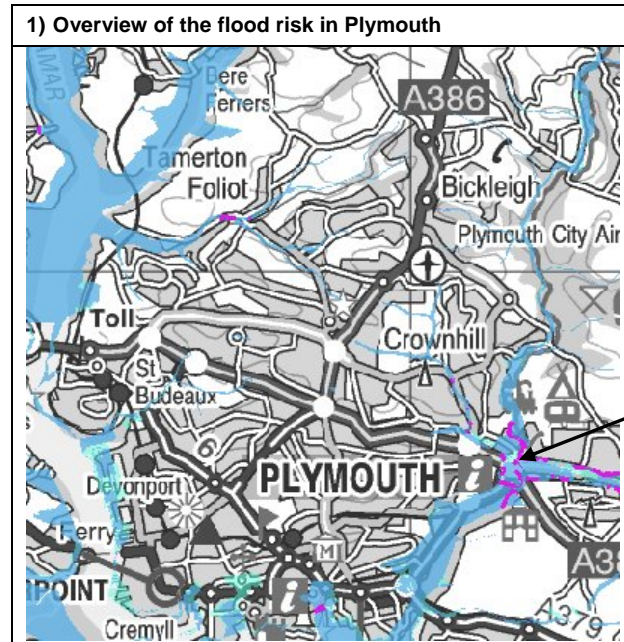
Flood frequency is usually interpreted in terms of a return period e.g. 1 in 50 or 1 in 100 year event etc. It is often necessary to interpret information about a flood frequency in terms of the risk of exceedence, i.e. the probability of a flood exceeding a threshold value. There is for example a 1 in 100 (1%) risk of one or more 100 year floods occurring in a given year.

6.3 Baseline Methodology

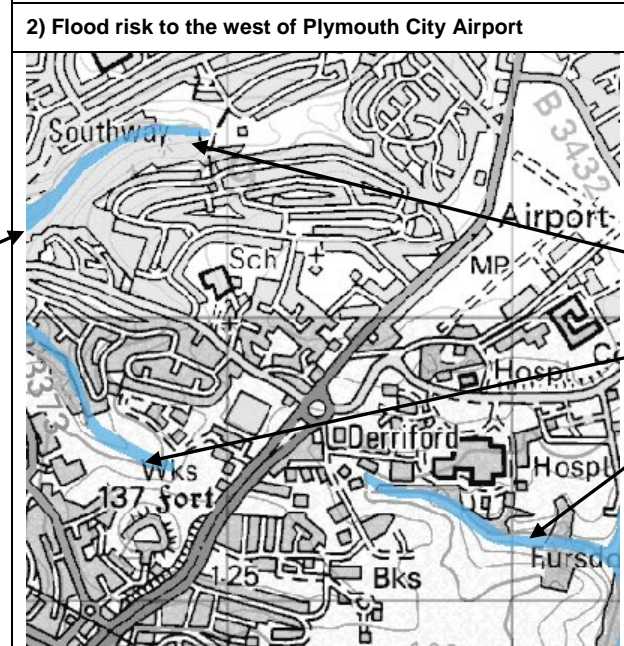
A desk-based study was undertaken to establish the existing flood risk for Plymouth City Airport. Data on flood risk was obtained from the EA's flood maps. An analysis of the information reproduced in this report identified any areas that may be susceptible to flooding from surface waters and includes details of flood defences.

6.4 Baseline

The following baseline is a series of maps reproduced from the EA's website. Each map illustrates the location and risk of flooding for locations around Plymouth City Airport.

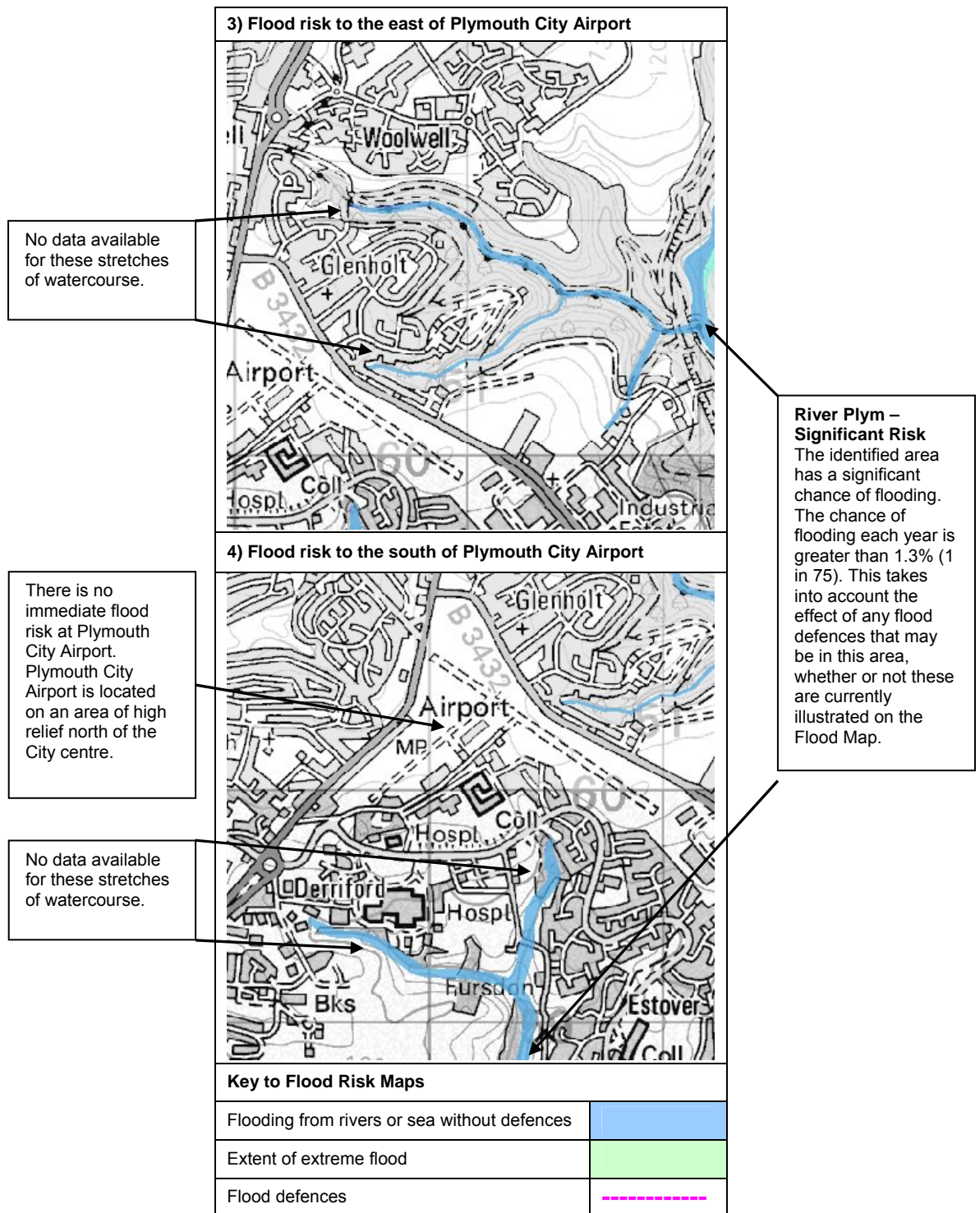


River Plym – Significant Risk
 The highlighted area has a significant chance of flooding. The chance of flooding each year is greater than 1.3% (1 in 75). This takes into account the effect of any flood defences that may be in this area, whether or not these are currently illustrated on the Flood Map.



Unnamed watercourse – Significant Risk
 The identified area has a significant chance of flooding. The chance of flooding each year is greater than 1.3% (1 in 75). This takes into account the effect of any flood defences that may be in this area, whether or not these are currently illustrated on the Flood Map.

No data available for these stretches of watercourse.



6.4.1

Landmark Survey

A Landmark Survey was commissioned for this baseline study and provided information on historical flood events and details of current flood defences for nearby watercourses. According to this survey there are no records of flooding ever occurring within the study area and none of the watercourses close to Plymouth City Airport currently require or have flood defences.

6.5 Assessment of Effects on of the Proposed Development on Flood Risk

6.5.1 Potential Sources of Effects on Flood Risk

The potential sources of effects of the airport expansion options on flood risk include:

- Increased impermeable surface area associated with runway extension and increased apron area

6.5.2 Assessment of Effects on Flood Risk

Table 6.1 below, summarises the potential effect that the different development options for the airport extension may have on flood risk. The table also recommends possible mitigation measures or further studies that should be implemented to reduce, avoid or offset any adverse effects on flood risk.

Table 6.1 Summary of the Potential Effects of the Proposed Airport Expansion Options on Flood Risk

Effect	Development Option	Potential Impact and Proposed Mitigation
<p>Changes to the risk of flooding from an increase in impermeable surface area</p>	<p>Options 1, 2, 3 and 4</p>	<p>Flooding can result from a wide range of events and processes, occurring naturally or as a result of human interference with natural processes. Flooding becomes a problem only when it has an adverse impact on people, property, infrastructure or the environment. Guidance on the assessment of flood risk for new developments is provided by Planning Policy Guidance Note 25 – Development and Flood Risk (PPG25) and it is good practice to consider the impact of a development on flood risk at the site of the development and also the impact of the development on flood risk downstream of the site. The Environment Agency (EA) and Local Authority should be contacted for a screening opinion if the development proceeds.</p> <p>Plymouth City Airport is not located in an area at risk of flooding as defined by the Environment Agency’s flood map. Therefore, any new development at the Airport would itself not be at risk from riverine flooding. However, flooding can occur at any time and in any place from many other sources such as rising ground water levels, burst water mains, road drains, run-off from hillsides, sewer overflows etc. which are not modelled by the EA and these may need to be considered by the design team when developing the drainage system should the proposed development go ahead.</p> <p>No data was available from the EA flood map for the several minor watercourses that drain in a radial pattern away and downhill from the Airport, but both the River Plym and Tamar-Tavy estuaries have extensive valley flood plains considered at risk from periodic flooding.</p> <p>There is the potential for a change in runoff regime because of an increase in impermeable surface area where grassed areas have been acquired for the taxiways and runway extension/RESAs, although much of the redevelopment will utilise already developed land. Increasing the impermeable surface area at the Airport will generate a greater volume of surface runoff which will need to be appropriate conveyed to ground or other proposed discharge point. Adequate drainage provision will need to be provided for this additional runoff. The existing drainage system at the Airport allows surface water to drain freely into the ground and it is understood that this would be preferentially continued for the proposed development. Therefore, should this arrangement continue, it is unlikely that the development will have any adverse impact on flood risk downstream of the study area.</p> <p>Based on the available drainage information surface water will drain to ground with none proposed to discharge to any of the minor watercourses draining to the River Plym or Tamar-Tavy estuaries. The design of the proposed development must take into account the additional drainage from the expanded Airport and ensure that it will be effectively conveyed from the site. Appropriate investigations should be conducted if discharge consent to any small nearby watercourse is proposed. The Environment Agency and Local Authority should be contacted for advice on whether a Flood Risk Assessment is required should the proposed development proceed.</p>

7 Ground Contamination

7.1 Scope of the Assessment

The following assessment has been undertaken to determine the characteristics of the existing ground conditions on the airport site, to identify any potential sources of ground contamination and to assess whether the ground conditions would potentially constrain the proposals for the extension of the airport. The chapter also includes recommendations for further assessment work that would be required to determine the exact level of constraint that would be placed on the development as a result of the existing ground conditions, and recommends measures for reducing the potential levels of constraint.

7.2 Method

The assessment of the ground conditions in and around the airport, and the identification of any areas of ground contamination involved a desk study and site visit. No detailed analysis (e.g. trail pits) of the airport site or surrounding area has been undertaken as part of this study.

7.2.1 Desk Study

The following methods were used to determine the existing ground conditions at the airport site:

- Review of a Landmark Envirocheck Report for the airport site and immediate surrounding area
- Review of a Landmark Geological Report for the airport site and immediate surrounding area
- Identification of potential sources of ground contamination associated with airport activities
- Existing measures on site implemented to prevent ground contamination

A copy of the Landmark Envirocheck Report maps for the Airport Site and surrounding area is presented in Appendix E.

7.2.2 Site Visit

A site visit was undertaken in October 2005. The purpose of the site visit was to identify any potential sources of ground contamination that may be affected by the proposed development.

7.3 Baseline Ground Conditions

7.3.1 *EnviroCheck Report Results*

The map provided as part of the EnviroCheck report illustrates within the airport site there is a Contemporary Trade Directory Entry in the location of the main terminal building. The trade directory entry is for Peters & May Ltd Freight Forwarders. The status is currently active.

In addition to the Trade Directory Entry the EnviroCheck report has also identified the potential issues associated with the airport site:

- Groundwater Vulnerability
- Shallow Mining Hazards
- Potential for Compressible Ground Stability Hazards
- Potential for Landslide Ground Stability Hazards
- Potential for Running Sand Ground Stability Hazards
- Potential for Shrinking or Swelling Clay Ground Stability Hazards
- Radon Affected Area
- Radon Protection Measures

With regard to the above ground conditions the following observations have been made:

7.3.2 *Groundwater Vulnerability*

Groundwater vulnerability zones identify groundwater features that are vulnerable to pollution or over extraction. Groundwater aquifers may be vulnerable if they used are for abstraction purposes, or support other water features that are used for abstraction or are ecologically sensitive.

The airport site is located over a minor aquifer with variable permeability. These types of aquifer can be fractured or potentially fractured rocks, which do not have a high primary permeability, or other formations of variable permeability including unconsolidated deposits. Although not producing large quantities of water for abstraction, they are important for local supplies and in supplying baseflow to rivers.

The appraisal will need to identify whether there will be any potential effects on groundwater due to proposed changes in the site drainage or breaches of the aquifers associated with the construction and operation of the proposed development.

7.3.3 *Shallow Mining Hazards*

Although there are no mine shafts recorded within the airport site, there may have been historical unrecorded mining activities in the area which could extend under the airport site. It was identified from the EnviroCheck Geological Report that the airport site is located within an area with bedrock of Upper Devonian Slate. Any mining activities would likely to be associated with the seams of lead or tin that are often found within slate.

7.3.4 *Compressible Ground Stability Hazards*

The ground within the airport site and the immediate surrounding is soft and may be susceptible to slippage or settlement. This will need to be considered with respect to both the proposed mixed use development and the construction of the runway extension.

7.3.5 *Landslide Ground Stability Hazards*

The potential stability hazard may be associated with the steep slopes located towards the south of the airport boundary and the character of the ground surface, and its potential for compression as well as shrinkage and swelling. The EnviroCheck Report has also identified the potential for Running Sand Ground Stability Hazards within the airport site. This suggests a high water table within the airport site which, in the event of high rainfall may contribute to the potential for instability.

7.3.6 *Running Sand Ground Stability Hazards*

As mentioned above this indicates that there is the potential for a high water table within the airport site. This may contribute to the groundwater vulnerability, landslide potential and may also increase the risk of flooding.

7.3.7 *Shirking or Swelling Clay Ground Stability Hazards*

Clay is susceptible to shrinkage or swelling. This can have a negative effect on structures by causing cracks and stress fractures. This needs to be taken into consideration with regard to the proposed runway, airport infrastructure and mixed use development.

7.3.8 *Radon Affected Areas and Radon Protection Measures*

Areas with potential for moderate to high levels of radon, as identified in the Radon Affected Areas, occur where granite is found close to the surface. The assessment needs to consider the potential for Radon Protection Measures to be implemented in the mixed use development, particularly residential properties, and in association with any modifications or extensions to the main terminal building.

7.4 **Baseline Ground Conditions Outside the Airport Site**

The EnviroCheck Report also identified a number of local features with the potential to impact on the ground condition of the airport site. These include:

- Discharge Consents
- Pollution Incidents to Controlled Waters
- Registered Radioactive Substances
- Licensed Waste Management Facility (Location)
- Local Authority Recorded Landfill Site
- Point Location of Registered Waste Transfer Site
- Registered Waste Transfer Site
- Point Location of Registered Waste Treatment or Disposal Site
- BGS Borehole
- Contemporary Trade Directory Entry
- Fuel Station Entry
- Local Authority Integrated Pollution Prevention and Control Site

With regard to these potential impacts the following observations were made:

7.4.1 *Discharge Consents*

There were four discharge consents identified in the area immediately adjacent to the airport site. Three of the discharge consents were for domestic properties, one was multiple. The other consent was for an industrial operation.

7.4.2 *Pollution Incidents to Controlled Waters*

There were three recorded pollution incidents to controlled waters. One was associated with the St John and St Mark College and one was recorded from industrial premises located to the west of the airport and south of the college. The third incident was from a water sewerage company situated to the west of an area of housing adjacent to the western site boundary.

7.4.3 *Registered Radioactive Substances*

There are three registered radioactive substances licence areas in the vicinity of the airport site. One of the registrations is associated with Derriford Hospital. The registration is for the keeping and use of radioactive materials. The other two registrations are associated with Viridor Waste Management in association with the hospital. These registrations are for the disposal of radioactive waste.

7.4.4 *Waste Management and Disposal Facilities*

All licenses for waste management and disposal facilities, except the local authority registered landfill, are associated with Derriford Hospital which is located to the south west of the airport.

7.4.5 *Local Authority Registered Landfill*

An area of land immediately adjacent to the western boundary of the airport is registered as a local authority landfill site. The land is currently occupied by housing and other development. However its presence near to the airport should be noted.

7.4.6 *BGS Boreholes*

All recorded boreholes are associated with the Tamar Science Park, the St John and St Mark College and Derriford Hospital. The purpose of the boreholes is unknown.

7.4.7 *Fuel Station Entry*

The fuel station entry relates to a petrol station located approximately 100m north of the airport on the A386 Tavistock Road.

7.4.8 *Local Authority Integrated Pollution Prevention and Control*

The company Fine Tubes has an IPPC licence for the production and processing of metals. This operation is located at the southeast corner of the airport boundary.

7.5 Potential Areas of Contamination within the Airport

The site visit identified two potential areas of ground contamination within the airport. These include:

- Fire Testing Ground
- Maintenance Hanger

7.5.1 *Fire Testing Ground*

In order to meet the training requirements for United Kingdom Airport Fire Services, a purpose provided training rig was installed in the area designated as the Airport Fire Training Ground. Fuel oil was sprayed onto the rig allowing realistic scenarios for Airport Fire Fighters to train with.

Fire fighting foams have been used in this former test facility. Historical activities without the facility to contain, collect and treat such materials will have had the potential to introduce both fuel related hydrocarbons and residues from fire fighting foams.

The extent and significance and any contamination is at this time unknown. Potential components of fire fighting foam perfluorooctylsulphonate (PFOS), is a fluorinated surfactant material and potential carcinogen. Perfluorohexyl sulphonate is a persistent substance which is a breakdown material from the foam

The Fire Training Ground has subsequently been upgraded to provide a bunded concrete platform where both fuels and foam residues are collected and treated prior to discharge.

7.5.2 *Maintenance Hanger*

The existing maintenance hanger lies adjacent to the southern boundary of the western section of the airport. There is potential for activities within the aircraft hanger to result in an accidental spillage of fuel or engine oils during maintenance or cleaning.

7.6 Assessment of Effects on of the Proposed Development on Flood Risk

7.6.1 *Potential Sources of Effects on Ground Conditions and Contamination*

The potential sources of effects of the airport expansion options on ground conditions and contamination include:

- Construction of the embankment
- Removal of fill material from within the airport site for the construction of the embankment
- Mixed use development
- Relocation of the airport infrastructure

7.6.2 *Assessment of Effects on Ground Conditions and Contamination*

Table 7.1 below, summarises the potential effect that the different development options for the airport extension may have on ground conditions and contamination. The table also recommends possible mitigation measures or further studies that should be implemented to reduce, avoid or offset any adverse effects on ground conditions and contamination.

Table 7.1 Summary of the Potential Effects of the Proposed Airport Expansion Options on Ground Conditions and Contamination

Effect	Development Option	Potential Effect and Proposed Mitigation
Construction of the embankment and remove of fill materials from within the Airport for use in constructing the embankment	Option 1 (No RESA)	There will be no effects associated with this option as there will be no need to construct an embankment
	Options 1 (With RESA), 2, 3 and 4	<p>The results of the Landmark Envirocheck Report identified the following potential ground condition issues associated with the airport site:</p> <ul style="list-style-type: none"> ■ Shallow Mining Hazards ■ Potential for Compressible Ground Stability Hazards ■ Potential for Running Sand Ground Stability Hazards ■ Potential for Shrinking or Welling Clay Ground Stability Hazards ■ Radon Affected Area ■ Radon Protection Measures <p>Plymouth Airport is situated on top of a hill. Therefore to facilitate the construction of the RESA (option 2) and the airport extension (options 3 and 4) an embankment is required to raise the height of the land immediately to the southwest of the airport to make it level with the existing runway. To reduce the costs associated with the construction of the embankment, and to reduce the need for fill materials to be imported from external sources, there is an option to use fill materials from within the airport site.</p> <p>This assessment has identified that the ground movement activities associated with the construction of the embankment and removal of fill material from within the airport site has the potential to be affected by the above ground conditions.</p> <p>The full extent of these ground condition issues is not known at present. It is therefore recommended that to ensure that ground conditions do not have any adverse effects on the proposed development, more detailed surveys are undertaken.</p> <p>The airport is also situated in a groundwater vulnerable zone. Further studies into the location and depth of the minor aquifer may be required to determine the potential for activities associated with the removal of fill material from within the airport site and the construction of the embankment to breach the aquifer. A breach of the aquifer may have an adverse effect on groundwater quality. Reductions in groundwater quality can have adverse effect on local abstractors and the quality of receiving watercourses.</p> <p>The Landmark Environmental Report also identified that there is a Local Authority Recorded Landfill adjacent to the western boundary of the airport, opposite runway 13/31. It is unlikely, due to its location on the western side of the airport where opportunities for obtaining fill material is limited, and that fact that the site has already been redeveloped for housing, that the development will have any effect upon the landfill.</p>
Mixed Use	Option 1	There will be no effects as there will be no requirement to sell/lease part of the airport site for mixed use development under this option

Development	Options 2, 3 and 4	The mixed use development will occupy land to the west of runway 06/24. The maintenance hanger is located to the south of the area that is proposed for mixed use development. In the event that options 2, 3 or 4 go ahead, the aircraft maintenance hanger will have to be relocated elsewhere within the airport site. Ground investigations will be required to assess whether the ground beneath the maintenance hanger and in the immediate vicinity of the hanger is contaminated.
Effect	Development Option	Potential Effect and Proposed Mitigation
Relocation of the Airport Infrastructure	Option 1	There will be no effects as there will be no requirement to relocate the airport infrastructure for option 1
	Options 2, 3 and 4	Part of the relocation of the airport infrastructure may involve the extension of the main terminal building. Due to the airport being located within a Radon Affected Area further investigation may be required to determine the methods that should be incorporated in the design of the terminal building extension to minimise the effects of Radon. It is expected that the Fire Training Facility will not have to be relocated as part of the airport extension scheme. Therefore there will be no effect of contamination from the Fire Training Ground. As mentioned previously the aircraft maintenance hanger may have to be relocated to accommodate the mixed use development. Ground investigations will be required to assess whether the ground beneath the maintenance hanger and in the immediate vicinity of the hanger is contaminated.

8 Cultural Heritage

8.1 Scope of the Assessment

This chapter addresses issues of cultural heritage in the study area including sites of historical and archaeological importance that may be affected by the different options proposed for the development of Plymouth City Airport.

8.2 Baseline Methodology

A desk-study was undertaken to establish a cultural heritage baseline. The main source of information was Plymouth City Council's Strategy Unit, Planning and Regeneration Service who conducted a search of the SMR on our behalf. Any Scheduled Monuments or other notable historic or archaeological sites within 500m of the Airport were identified.

8.3 Baseline

Plymouth City Council provided the following information:

8.3.1 *Listed Buildings*

Historic buildings are valuable, finite assets and physical reminders of past industry and previous ways of life. English Heritage is the national body charged with identifying and protecting this inheritance. Buildings can be protected by being "listed" with emphasis being on continued use. A Listed Building has legal protection and is placed on statutory lists of buildings of "special architecture or historic interest" compiled by the Secretary of State Culture, Media and Sport under the Planning (Listed Building and Conservation Areas) Act 1990. Listing of a building ensures that its special architecture and/or historic value is carefully considered before any alterations to the outside or inside are agreed. There are three levels of listing as described below:

- Grade I - buildings are of exceptional interest and have the greatest protection.
- Grade II* - are particularly important buildings of more than special interest.
- Grade II - buildings have special interest, warranting every effort to preserve them.

The search by Plymouth City Council of the SMR revealed two listed buildings (NGR 4973760182 and 4971560223) within 500m of the Airport's eastern perimeter. The two buildings are both Grade II listed and are part of the same 19th century house complex. They are located to the north the A386 (Tavistock Road) which runs parallel to runway 06/24. It is unlikely, due to their location, that any construction works will have a direct impact upon either building. Table 8.1 summarises the information available. The location of the listed buildings is illustrated in Figure 8.1.

Table 8.1 Listed Buildings within 500m of Plymouth City Airport

NGR	Listed Building Number	Site Type	Description
49737 60182	740- 1/2/122	Grade II Listed Building - Tavistock Road, Crownhill, (North West side) Gate-piers and flanking walls at entrance to No.327 Powisland House	Gate-piers and flanking walls. Early C19. Freestone ashlar, the piers taller and rusticated with plinths and squat pyramid copings. Square-on-plan gate-piers flanked by convex quadrant-plan walls. Old wooden dowelled gate with 3 rails and round-arched bracing. Included for group value with Powisland House (qv).
49715 60223	740- 1/2/121	Grade II Listed Building - Tavistock Road, Crownhill, (North West side) No.327 Powisland House	(Formerly Listed as: Tavistock Road, Crownhill Powisland) Small country house. Early C19. Painted slate hanging; dry slate hipped roof with projecting eaves and rendered end stack on the left. Double-depth plan plus service wing at rear right and parallel to rear. 2 storeys over basement; symmetrical 3-window front. Original hornless sashes with glazing bars plus central doorway with original flush-panelled door within old hip-roofed conservatory with glazing bars to windows and pair of glazed doors. Interior: not inspected except to note original open-well staircase with open string and stick balusters, also ceiling cornice to left-hand room and panelled door with beaded panels.

8.3.2

Scheduled Monuments

The “scheduling” of monuments is the process by which nationally important sites and monuments are given legal protection by being placed on a list. Under the current legislation (the Ancient Monuments and Archaeological Areas Act 1979) English Heritage is responsible for the identification of sites that should be protected and placed on the list by the Secretary of State for Culture, Media and Sport.

The term “monuments” refers to a wide range of archaeological sites of which there are 200 classes. A search of Plymouth City Council’s Sites and Monuments Record (SMR) identified that, there are no Scheduled Monuments located within 500m of the airport boundary.

8.3.3

Other Sites of Archaeological and Historical Importance

The search of Plymouth City Council’s SMR identified 16 sites of archaeological and historical interest within 500m of the airport. Details of these sites are presented in Table 8.2. The location of the sites are illustrated in Figure 8.1.

Table 8.2 Scheduled Monuments within 500m of Plymouth City Airport

	Site	SMR Number	National Grid Reference	Description
1	Inn	SX56SW/298	5001960801	'George Hotel' indicated on OS 6' (1907) and on OS 6' (1954) (OS)
2	Airfield	SX56SW/340	5009960500	Plymouth or Roborough Airfield. Wartime requisition airfield recorded on RAF 1946 AP. Rectangular disposal bays recorded around field perimeter. Blister hangar in NW corner. Also airfield technical buildings at SX502602 (APH). Pens and buildings, not the blister hangar, recorded on OS 6' (1954) Map (OS). First used for civil flights in 1923. First licensed in 1929. Saw regular passenger flights on internal routes. Requisitioned for naval flying in 1939. RAF arrived in 1940, flying Gloster Gladiators during the Battle of Britain. Various air-sea rescue and night-fighter aircraft also stationed here. Resumed as civil airport after the war (Teague).
3	Airfield	SX46SE/103	4990060101	Plymouth or Roborough Airfield. Also RAF Roborough. Recorded on RAF 1946 AP (APH).
4	Airfield	SX56SW/340/001	5049960200	Roborough Airfield also in former Egg Buckland Parish. RAF 1946 AP records technical buildings and dispersal pens (APH). Pens and buildings recorded on OS 6' (1954) Map (OS).
5	Milepost	SX46SE/071	4989960310	'Milepost' indicated on OS 6' (1907) and on OS 6' (1954) (OS)
6	Enclosures	SX56SW/052	5030060300	2 circular enclosures one north north east of the airport buildings, the other east north east (Plym Mus). (Location could be suspect - Bovey). Not visible on 1946 RAF Verticles (RCHM APP 1985). 1 circle is clearly recorded on RAF 1946 AP to end of airfield buildings. It may be well be visible remains of the pre-war airfield recognition marker circle (Horner).
7	Early C19 House	SX46SE/063	4971960221	Powisland, Tavistock Road, Crownhill. Early C19 house. Slate hung, painted. Slate hipped roof with wide eaves. 2 storeys and basement. 3 windows wide sashes with glazing bars. Flush panelled central door enclosed by modern glazed conservatory porch (DOE).
8	Boundary Stones	SX45NE/013	4994559986	Boundary stones 38 and 38A at the top of Derriford Hill, Built into the hedgebank about 1 1/2km north of Crownhill on the side of the road close to the junction with Plymbridge Lane. Between them is a roughly hewn granite block which may be an older boundary mark. The left hand stone bears the inscription 'Tamerton Foliot' and the right hand stone 'Egg Buckland'.
9	Boundary Stones	SX45NE/308/001	4998959941	No information available.
10	Boundary Stones	SX56SW/299/001	5009960050	No information available.
11	Plymouth Leat	SX46SE/034	4996760029	Plymouth Leat. Total length runs from Burrator (SX551680) to Plymouth (SX469541) and consists in most places of a granite lined hand dug channel, although this varies. Sir Francis Drake was granted £200 sterling for its construction and gave permission to erect and work six mills along it for 67 years. Location of mills not given.
12	Devonport Leat	SX46SE/038/001	4990660000	The Devonport Leat, which runs through the parish of Tamerton Foliot. Similar to Plymouth Leat mentioned above.
13	Former reservoir	SX45NE/313	4991059965	Reservoir clearly shown on the 1933 map but appears not to be in use by 1957.
14	Chapel	SX55NW/221	5013559987	Site of a chapel shown on OS maps. Not shown in 1840 or 1870 but does appear in 1895. Methodist chapel indicated in 1907, Baptist chapel indicated in 1950 and 1968.
15	Building	SX55NW/055	5011559978	Building called 'Thornbury' in Egg Buckland. Mentioned by historian R. N. Worth for the possible implications regarding its name (possible earthworks in vicinity).
16	Barrow	SX55NW/093	5011559950	South of Thornbury Farm a dozen or more dot and circle cropmarks are visible. This could be a ploughed down barrow field. One is isolated, the rest cluster round a grid reference. Could be as many as 28 barrows.

The SMR search revealed 16 records of monuments and archaeological sites within 500m of the Airport. Apart from a number of milestones, boundary stones and references to the former historic airfield, there are also references made to the course of the Plymouth "Leats" which are discussed in more detail below.

8.3.4 *The Plymouth "Leats"*

Within Plymouth there are three separate "Leats" (a historic artificial drainage ditch) called Plymouth, Devonport and Stonehouse Leats, the oldest dating from the 16th century. Two of these Leats, Plymouth and Devonport, have been identified within 500m of the airport following the SMR search. Houses and gardens mostly hind the former course of these Leats and they no longer serve any practicable purpose as a functional watercourse. The Plymouth Leat drains from north of Tavistock Road (i.e. north of runway 06/24) away from Plymouth City Airport, following the contours of the land. Plymouth City Council would require all efforts to be made in order to identify the course of the Leat and to protect it from any significant adverse impact.

8.4 **Assessment of Effects on of the Proposed Development on Cultural Heritage**

8.4.1 *Potential Sources of Effects on Cultural Heritage*

The potential sources of effects of the airport expansion options on cultural heritage:

- Construction of the embankment
- Removal of fill material from within the airport site for the construction of the embankment
- Mixed use development
- Relocation of the airport infrastructure

8.4.2 *Assessment of Effects on Cultural Heritage*

Table 8.3 below, summarises the potential effect that the different development options for the airport extension may have on cultural heritage. The table also recommends possible mitigation measures or further studies that should be implemented to reduce, avoid or offset any adverse effects on cultural heritage.

Effect	Development Option	Potential Effect and Proposed Mitigation
Construction of the embankment and remove of fill materials from within the Airport for use in constructing the embankment	Option 1 (No RESA)	There will be no effects associated with this option as there will be no need to construct an embankment
	Options 1 (With RESA), 2, 3 and 4	<p>The results from the search of the Devon County Council Sites and Monuments Records (SMR) identified that there are no Scheduled Monuments within the airport or 500m from the airport perimeter.</p> <p>The SMR did identify a building within the Estover Industrial Estate called Thornbury. Although the building is not a Listed Building, there may be some important earthworks associated with it. There is potential that the construction of the RESA and embankment, as proposed under Options 2, 3 and 4, would result in the disturbance or loss of this building and the associated earth works.</p> <p>Plymouth City Council has recommended that a detailed archaeological survey of the proposed RESA and embankment construction area is undertaken prior to the commencement of development to fully establish the archaeological potential of this building. Appropriate mitigation measures will be developed in consultation with Plymouth City Council following the results of the survey.</p>
Mixed Use Development	Options 1, 2, 3 and 4	There will be no effect on cultural heritage as there are no recorded sites of archaeological importance or listed buildings within the proposed mixed use development area.
Relocation of the airport infrastructure	Options 1, 2, 3 and 4	The SMR records have identified 2 circular enclosures. These are located north northeast and east northeast of the airport terminal buildings. Any redevelopment/expansion of the airport terminal building or the airport apron area will need to take these into consideration through discussion with the City Council and appropriate recording of the features.

9 Conclusion

The following table provides a summary of the key environmental issues identified in relation to the proposed extension of Plymouth City Airport.

9.1 Introduction

This environmental appraisal was undertaken to inform the study for Sutton Harbour Holdings Plc and Plymouth City Council investigating the opportunities for the expansion of Plymouth City Airport. The results of this environmental appraisal will be used to inform the selection of a preferred development option. The chosen option will then be investigated further prior to submission of an application for planning permission to Plymouth City Council.

9.2 Environmental Appraisal

This environmental appraisal provides an overview of the environmental issues associated with each of the different airport expansion options. The issues were identified through desk-based studies and from consultation with representatives from Plymouth City Council and Sutton Harbour. No detailed environmental 'impact' assessments (EIAs) were undertaken as part of this study.

In addition to the identification of key environmental issues associated with the different options for the airport expansion, the appraisal also suggests a number of mitigation measures that could be implemented to offset, reduce, or avoid any potentially adverse effects that may have been identified.

The results of this environmental appraisal will then be used by Sutton Harbour and Plymouth City Council to inform the development of an airport expansion scheme that will form the basis of an application for planning permission. The results from this environmental appraisal will also be used to make recommendations for further study to ensure that the planning application is in full compliance with current environmental legislation and with national, regional and local environmental, land use and transport policy.

9.3 Key Findings and Issues

It was identified, through the environmental appraisal process and consultation with Plymouth City Council that the two main key issues that would potentially affect the future development of Plymouth City Airport are noise and surface access.

Issues associated with noise have been identified as:

- There is the potential that an increase in the number of aircraft departures and arrivals may lead to an increase in overall noise emissions and hence an increase in the number of residential properties likely to experience 'Low Community Annoyance' noise levels. However, a more detailed noise assessment would be required to assess the precise impacts of increased aircraft movements on local residents. There is the potential for the noise emission from an increase in aircraft movements to be off-set by reducing some light aircraft training exercises which have been identified as being of a source noise nuisance by local residents.

- There may be changes in the current noise contour patterns due to a change in the types of aircraft that would operate at the airport following the extension of the runway. A detailed noise assessment should be undertaken to determine how the noise contours would change, and hence the predicted impact on local residents.
- Increased aircraft movements will lead to an increase in the number of passenger surface access movements associated with the airport. There is the potential that the increase in airport generated traffic for high passenger forecasts under Options 3 and 4 could be as much as 580% to 600%. This would represent an increase in vehicle noise of approximately 8dB. This does not take into account non-airport traffic noise. A detailed noise assessment would be required to assess the full effects of an increase in noise levels from airport traffic along approach roads.
- There is potential that, under Options 2, 3 and 4, there will be a requirement to relocate the existing engine testing bay and aircraft hanger to accommodate a mixed use development on land the west of the airport. In the event that the engine test has to be relocated, an application for planning permission would be required. It is likely that, in light of the current problems associated with noise levels from engine testing, particularly early morning testing, it would have to be demonstrated that far more stringent environmental obligations, as part of a Section 106 Agreement could be met by the airport before planning permission would be granted. More detailed noise impact assessments would be required as part of the planning application.
- The removal of runway 06/24 for aircraft take offs and landings, especially light aircraft and helicopters, will provide some reduction in the potential noise impacts at receptors along Tavistock Road. There is potential for the mixed use development to provide opportunities for mitigation of the engine testing bay noise. This could be achieved by using non noise sensitive buildings to provide additional screening to the engine testing area and to use landscaping, in proximity to local residents, to further mitigate the noise pathway.
- There will also be opportunities to improve the design of the existing engine testing bay. This will help to reduce noise impacts at sensitive receptors by reducing noise pathway from the test bay to local receptors.

The main issues associated with surface access have been identified as:

- There are opportunities to minimising traffic generation during construction of any runway extension by sourcing fill material from within the airport boundary where possible. If this is not possible options should be identified to direct construction traffic along routes that would minimise environmental effects.
- The runway extension will result in the diversion of the footpath link at the Estover Industrial Estate. The best route for the footpath will need to be examined.
- To help reduce the potential for congestion as a result of an increase in traffic generated by the airport extension there is a need to develop reliable and frequent public transport access. This is needed both for airport staff and passengers and may probably best be achieved through the extension of one of the existing bus services serving Derriford Hospital
- To reduce the need to travel to the airport by road there is a need to enhance walking and cycling links between the airport and the local transport interchange sites, and to connect to the existing national and strategic network
- The possible closure of Runway 06-24 provides an opportunity to improve access to the A386 Tavistock Road Northern Corridor south of the George junction
- Management and rationalisation of car parking. Forecast increase in passengers to the airport is likely to see an increase in demand for car parking facilities but it should be possible to mitigate the requirement for car parking by provision of better public transport.

In addition to the issues associated with noise and surface access, the environmental appraisal also identified potential issues associated with:

- Air Quality
- Ecology
- Landscape Character and Visual Amenity
- Water Quality and Drainage
- Flood Risk
- Ground Contamination
- Cultural Heritage

The key issues, associated with the above, are summarised in Table 9.1.

Table 9.1 Summary of Environmental Issues Associated with Expansion of Plymouth City Airport

Effect	Development Option	Topic	Description of Potential Effects	Possible Mitigation
Construction of the embankment for the RESA and runway extension	Option 1 (No RESA)	All	There will be no effect as there will be no construction or ground movement activities.	None
	Options 1 (With RESA), 2,3 & 4	Air quality	There is the potential for dust to be generated during the transportation of fill material and the construction of the embankment. This may have a negative effect on local residents and the Wrigley's Factory.	Appropriate dust prevention measures including wheel washing, the use of covered vehicles to transport materials, and damping down fill materials prior to, and during, their movement.
		Ecology	Opportunities to use the embankment to improve the ecological value of land to the south of proposed runway development (Estover Industrial Estate). Construction of the embankment would involve the removal of a fairly mature section of hedgerow and hedgebank containing some large trees.	Hedgerow Survey as required under the Hedgerow Regulations 1997.
		Landscape	The construction of the embankment will change the local topography of the area, especially within the Estover Industrial Estate. The effect of the change in topography will be minor.	Opportunities for landscaping at the base of the embankment, and the surrounding area, should be incorporated into the design to "soften" its appearance
		Visual	There will potentially be slight negative short term and long terms effects on views from Estover Industrial Estate, Estover Residential Area and Plymbridge Road.	Opportunities for landscaping at the base of the embankment, and the surrounding area, should be incorporated into the design to "soften" its appearance and screen views from adjacent properties.
		Water Environment and Drainage	There is a slight risk of accidental spillages of hazardous substances on site and from HGVs, construction traffic and heavy plant. There is a potential risk of increased sediment loading of surface water runoff from the movement of fill material.	Follow appropriate construction good practice and guidance in the Environment Agency's PPGs 1, 3, 5, 6 and 21.
		Cultural Heritage	Possible earthworks associated with a building called Thornbury in the Estover Industrial Estate may be disturbed or lost during construction of the embankment.	Further archaeological surveys will be required to determine the extent of earthworks and their value

Effect	Development Option	Topic	Description of Potential Effects	Possible Mitigation
Removal of fill material from within the airport site for use during construction of the embankment	Option 1 (No RESA)	All	None-there will be no effect associated with this option.	None
	Options 1 (With RESA), 2, 3 & 4	Ecology	The removal of fill material from within the airport site may result in the loss of an area of moderately diverse unimproved grassland habitat that is potentially of County level importance. There is the potential for protected species (slow worms and lizards) to also be present on the land that would be disturbed by the removal of the fill material	Further surveys of the area of moderately diverse unimproved grassland are required to determine species that are present. Compensate habitat loss with habitat creation in the area of the RESA and runway extension. Protected species survey (slow worms and lizards) are required to identify the need for possible translocation requirements
		Landscape	There removal of fill from within the airport will have no effect on landscape character as the existing variation in topography is not a major contributor to the overall landscape character of the airport.	None specified.
		Visual	Increased visibility of the airport along the eastern and western perimeter due to the lowering of some part of the airport following the excavation of fill material.	Screen planting and landscaping may be required in certain locations to screen views from certain properties.
		Ground Contamination	There is potential that the removal of fill from within the airport site may breach the underlying groundwater aquifers that are in a ground water vulnerable zone. The movement of fill from within the site may disturb ground conditions identified in the EnviroCheck Landmark Report.	Further ground investigation surveys may be required before fill is removed from within the airport site
Increase in flight numbers, aircraft ground movements and surface operations	Options 2-4	Air quality	Despite an increase in flight movements associated with the airport, there will be no effect on CO ₂ emissions. This is due to the comparatively low number of flights compared to other airports and the predominance of turboprop engine aircraft.	No mitigation will be required
		Water Environment and Drainage	There is the potential that the increase in flight movements and ground operations will lead to an increased risk of accidental spillages of hazardous substances (e.g. fuel).	Follow recommended advice contained in the Environment Agency's PPG2 and PPG8.
Increased surface access movements	Options 2-4	Air Quality	There is the potential that the expansion of the airport will lead to an increase in passenger vehicle movements along the access routes to the airport. This may lead to a local reduction in air quality due to an increase in vehicle emissions.	Detailed air quality assessment will be required to determine exact effects of increased vehicle passenger movements on local air quality.

Effect	Development Option	Topic	Description of Potential Effects	Possible Mitigation
<p>Loss of land and construction of the mixed use development</p>	<p>Options 1-4</p>	<p>Ecology</p>	<p>The mixed use development may result in the loss of an area of moderately diverse unimproved grassland habitat that is potentially of County level importance. There is the potential for protected species (slow worms and lizards) to also be present on the land that would be used for the mixed use development.</p>	<p>Further surveys of the area of moderately diverse unimproved grassland are required to determine species that are present. Compensate habitat loss with habitat creation in the area of the RESA and runway extension. Protected species survey (slow worms and lizards) are required to identify the need for possible translocation requirements</p>
		<p>Landscape</p>	<p>The mixed use development will change the landscape character of the airport from an open and flat landscape to one that is built up and urban. However, the mixed use development will be in keeping with the landscape character of the surrounding area.</p>	<p>Detailed landscape assessment may be required The mixed use development should be of a high quality and designed to be in keeping with the surrounding area.</p>
		<p>Visual</p>	<p>The presence of the mixed use development will intrude upon current "open" views across the airport from properties located along Tavistock Road.</p>	<p>Detailed visual assessment of the proposed mixed use development. Incorporate screening into the design of the mixed use development. Ensure mixed use is a high quality development in-keeping with surrounding area.</p>
		<p>Water Environment and Drainage</p>	<p>There is a slight risk of accidental spillages of hazardous substances on site and from HGVs and construction traffic. There is a potential risk of increased sediment loading of surface water runoff from ground movements.</p>	<p>Follow standard "good practice" construction techniques and EAs PPG's.</p>
		<p>Ground Contamination</p>	<p>Ground investigations will be required to assess whether the ground beneath the maintenance hanger and in the immediate vicinity of the hanger is contaminated.</p>	<p>Further surveys will be required.</p>

Effect	Development Option	Topic	Description of Potential Effects	Possible Mitigation
Relocation of airport infrastructure	Options 1-4	Ecology	No long term adverse impact due to the low ecological value of the land that would be used for the relocation of airport infrastructure.	None required.
		Landscape	Although there will be a slight change to the appearance of the airport this will have minimal effect on landscape character.	New infrastructure should be of a high quality design and be in keeping with the character of the airport
		Visual	Although there will be a slight change to the appearance of the airport this will have minimal effect on visual amenity.	New airport infrastructure should be designed to a high quality and be in-keeping with existing airport infrastructure and buildings/structures in the surrounding area.
		Ground Contamination	Further investigation will be required to determine what mitigation will be necessary to minimise the potential impact of radon gas. No effect on ground contamination from the Fire Training Ground because it will not be moved. Ground investigations will be required to assess whether ground beneath the maintenance hanger and in the immediate vicinity of the hanger is contaminated.	Further surveys will be required.
		Cultural Heritage	Possible impact of the relocation of the maintenance hanger on two circular enclosures identified on the Sites and Monuments Register.	Further investigations will be required to determine the extent of potential impacts on these enclosures.

