

# A Forest Habitat Network for Edinburgh and the Lothians



The contribution of woodlands to promote sustainable development within the regional Structure Plan

Duncan Ray and Darren Moseley, Forest Research



This report has been prepared following a study by Forest Research, the research agency of the Forestry Commission and Britain's principal organisation for forestry and tree-related research. Forest Research is a world leader in the research and development of sustainable forestry. Visit us at [www.forestresearch.gov.uk](http://www.forestresearch.gov.uk)

Cover photograph – Patricia & Angus MacDonald/Aerographica

## Introduction

The region of Edinburgh and the Lothians has about 22,000 hectares of woodland, representing 13% of the total land area. These woodlands are varied, comprising narrow shelterbelts, estate woodlands, ancient woodland remnants in river gorge settings, and more recent conifer plantations. Woodlands with high biodiversity are typically the remnants of what was once a more extensive cover, but which has become fragmented over centuries due to changes in both type and pattern of land use. In particular, land has been cleared for agricultural use, which has accelerated over recent decades. Land has also been lost to development, with the spread of settlements and transport infrastructure. As a result, there has been a general decline in biodiversity over the wider countryside.

*Management and expansion of existing woodlands are now needed to conserve the remaining woodland biodiversity and ensure its future viability and integrity.*

This is particularly urgent, as pressures of climate change will force some species to move in order to avoid extinction.

It is vitally important that woodlands are managed using methods that maintain structural and tree species diversity, a wide range of micro-habitats that support diverse plant communities, and an adequate supply of deadwood. As woodlands mature, more complex structures develop, providing the diversity and longevity of suitable conditions needed for flora and fauna to establish and thrive. Increasing the woodland area, as well as the quality of existing habitats, will help ensure a healthy future for much woodland biodiversity.

## Regional strategic planning

The Edinburgh and Lothians Structure Plan 2015, approved by Scottish Ministers in June 2004, provides a 10-year strategic planning vision for the region. It draws together information from Local Plans of the four unitary authorities, and develops the planning policy required to maintain sustainable development of the region. The Structure Plan and Local Plans form the Statutory Development Plan, which provides the foundation for planning applications and future development.

Land use and transport are key issues at the heart of strategic planning, determining location and character of development areas. Choice of development area helps identify how the population distribution will respond, and how people will move through the region, between expanding urban areas and places of work or retail locations.

The Statutory Development Plan has identified 15 Core Development Areas (CDAs) for new housing development. These CDAs have been carefully examined and assessed to ensure they meet stringent sustainability criteria.

## Sustainable development

Sustainable development is a popular concept, and was famously articulated in the Brundtland Report as “development which seeks to meet the needs and aspirations of the present without compromising the ability to meet the needs of future generations”. This can only be achieved by development that does not damage those resources essential for future generations. The difficulty is that we cannot be certain which resources will become important in the future, so interpretation requires a cautious and carefully considered approach to development.

## Planning a healthy urban environment

As well as providing habitat for biodiversity, habitat — or woodland — networks can provide valuable recreational opportunities for communities. The region has a population of 778,000 (2001 census) and a housing requirement growing at a rate of 5,000 per annum. There is a growing recognition of the benefits of woodland in the urban environment and the need to improve and expand urban woodland close to communities. This requires management of existing woodland and planting of new areas.

Woodland in an urban environment is particularly beneficial for reducing physical and mental stress. Tree canopies intercept airborne pollutants from vehicles and heating systems, purifying the air we breathe in our towns and cities. Trees are effective at absorbing noise, and help to make a quieter environment. Woodland can provide opportunities for people to relax and enjoy nature; it offers an educational resource for children and adults, adds character and charm to the urban environment, screens houses and reduces the impact of new developments on existing communities. Woodland birds, sounds and colours also provide welcome signs of the changes in the seasons, improving the quality of life for urban communities.



© Crown copyright. All rights reserved, Forestry Commission, Licence No. 0100021242, 2007.

The matrix contains a diverse and intimate mix of habitats, including woodland, open ground and developed land

### Habitat fragmentation and its impact on ecosystems

The study of spatial and temporal interactions between a landscape and the organisms within it is called landscape ecology. The key principles of this are that individual species require habitat or habitat patches, and all non-habitat patches of the landscape mosaic constitute the matrix.

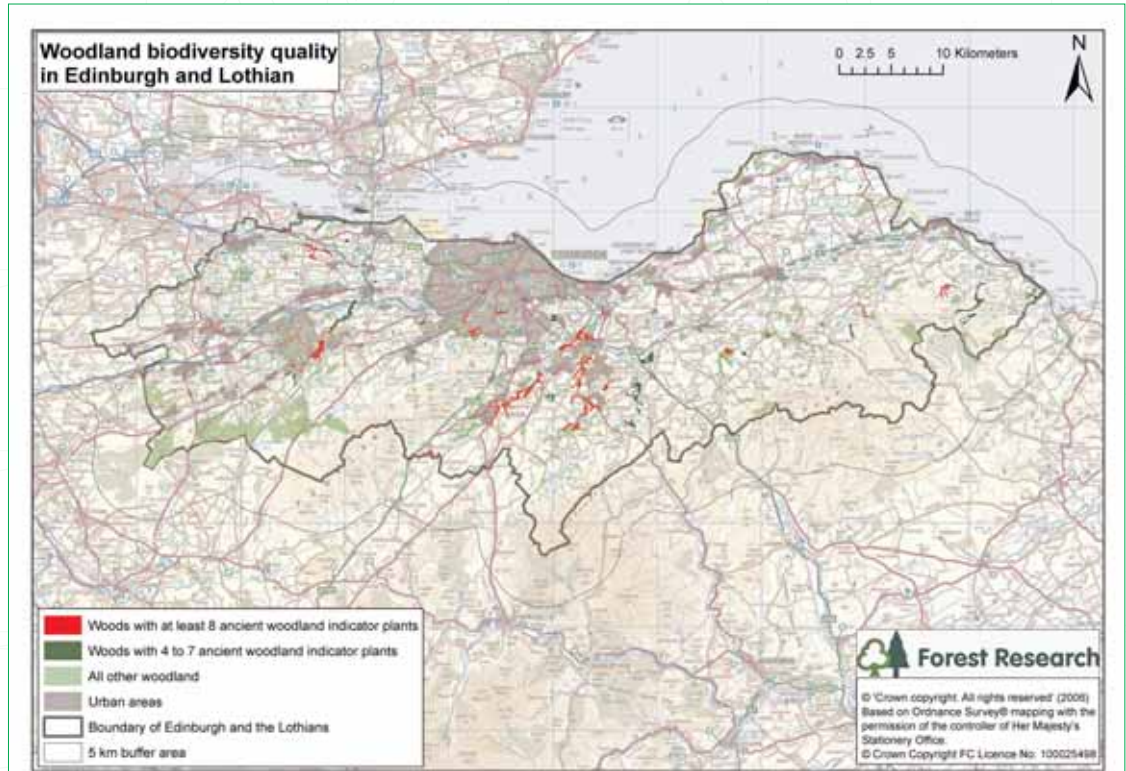
*Fragmentation* occurs as a result of the loss of habitat area, leading to local species extinction and the increased *isolation* of the remaining patches, threatening the exchange of individuals and recolonisation. The intensification of land use in surrounding patches may exacerbate isolation. Fragmentation has a serious impact on biodiversity, since the ability of species to respond to any disturbance is weakened. Ecosystems begin to fail at the landscape scale, because further disturbance cannot be absorbed within the remaining habitat, and species are not able to move between patches. A consequence of fragmentation is therefore a reduction in the resilience of species, and further disturbance is more likely to cause local extinctions.

Fragmentation can be countered by establishing *habitat networks* — functionally linked patches of habitat that are created/restored by spatially-targeted measures that modify the landscape to enhance species movement.

## Improving woodland networks within Core Development Areas

In the Lothians there are a number of examples where housing is situated in an incongruous way within the landscape as a result of the rapid urban development of the 19th and 20th centuries. The 15 CDAs will provide most of the new housing requirement for the next 10 years and it would be desirable for this new development to be sympathetically integrated into the landscape. Woodland can fill the important role of softening new urban areas, providing a natural link between the urban and surrounding landscape, and bringing wildlife into urban settings.

Design criteria set down in Local Plans and in Habitat Network principles (see main report at [www.forestresearch.gov.uk/habitatnetworks](http://www.forestresearch.gov.uk/habitatnetworks)) will guide developers to achieve robust landscape frameworks as well as detailed landscape and access requirements for new communities. Planning applications will be expected to address these issues, and the guidelines provided will apply in all circumstances. To identify key networks around the CDAs, a detailed investigation using a Geographic Information System (GIS) was carried out.



**FIGURE 1** High-quality woodland networks of the region

### Forest habitat network assessment method

Maps of the distribution of woodlands and other land cover types were assembled in a GIS. Forest Research used the land-cover data to evaluate habitat linkages across the region's landscape using a landscape evaluation tool from the Biological and Environmental Evaluation Tools for Landscape Ecology (BEETLE) toolkit. This tool examines the likelihood of woodland being functionally linked in the landscape and therefore of species being able to move from one woodland patch to another. Such linked woodlands have a minimum viable size, are close to one another (but not necessarily contiguous), and are unlikely to have intensively managed

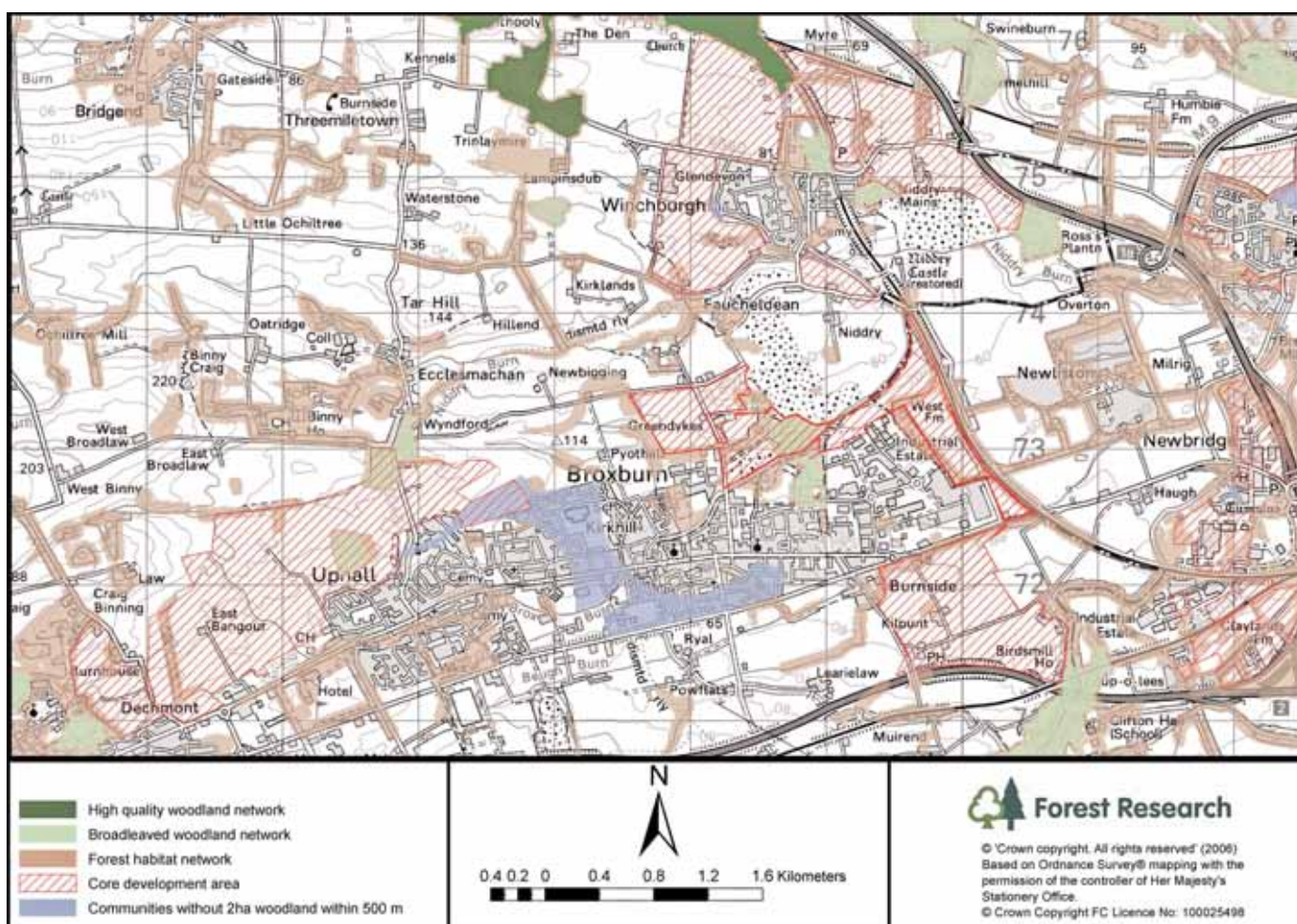
land or other hostile matrix, such as urban areas or water, between them.

As part of the analysis, we identified networks that contain woodlands of 'high biodiversity quality' (subsequently referred to as high-quality woodland) using the presence of ancient woodland plants as indicators of high biodiversity, from records held by the Lothian Wildlife Information Centre. The purpose was to draw attention to those networks that, through special management and expansion, can maintain the biodiversity resource of key woodland species and, over time, aid their dispersal throughout the surrounding network.

Within the region, 59 high-quality woodland networks have been identified, which are contained within a wider and more extensive forest habitat network. The main broadleaved woodland networks have been identified within 17 core woodland areas (Figure 1). The map displays an index of varying biodiversity value for woodlands in Edinburgh and the Lothians, based on the degree of linkage of high-quality woodland (core woodland areas) to adjacent woodland of lower quality. This can be used as a reference to determine and locate core woodland areas that should be protected and expanded (see main report for full description).

## Woodland habitat creation, networks and development opportunities

To demonstrate the range of challenges and opportunities for incorporating new woodland into the region's CDAs, three example areas with varying amounts of woodland and different development pressures are discussed.

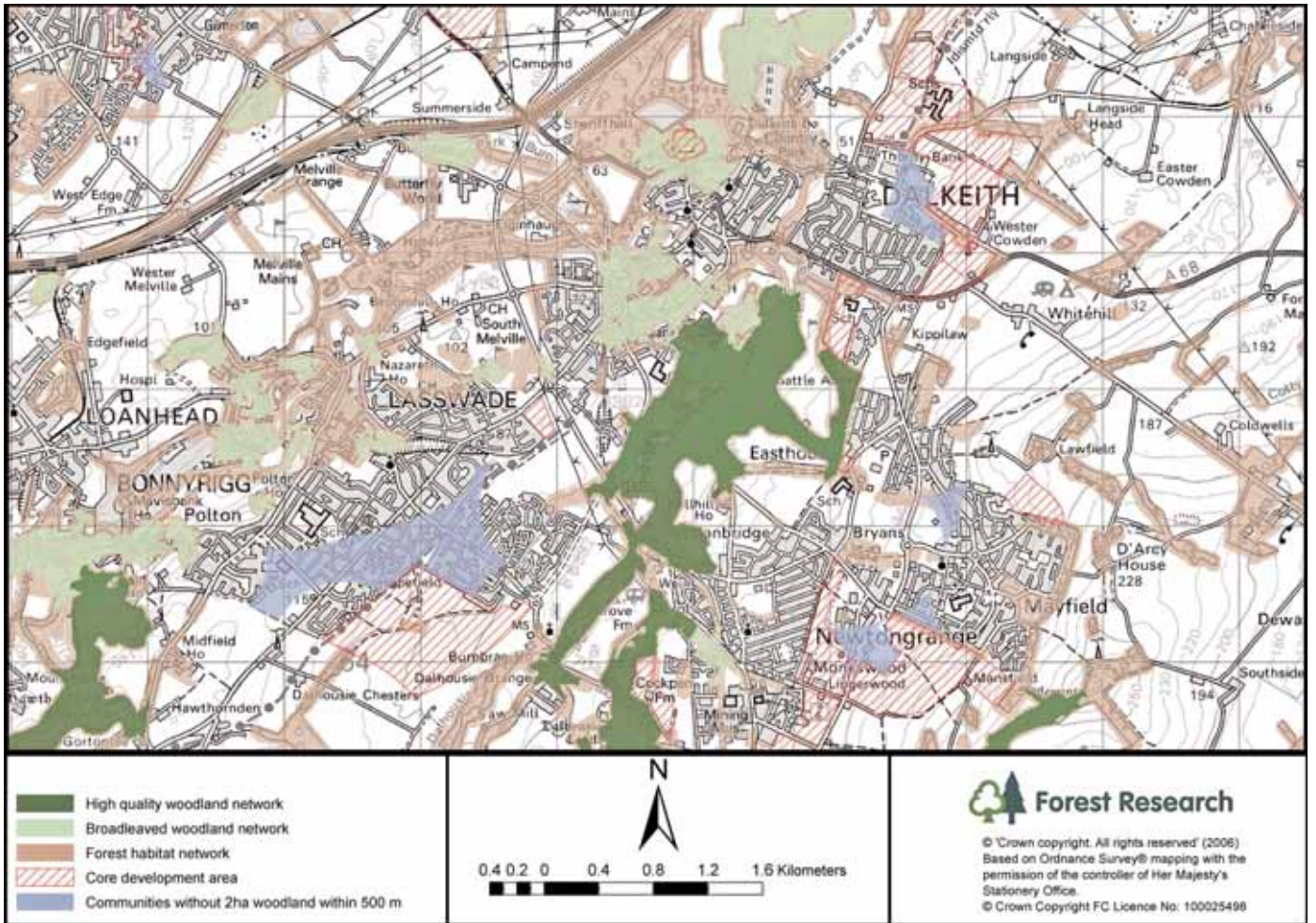


**FIGURE 2** Habitat network in the urban areas around Broxburn, showing the potential to improve biodiversity and woodland access

### 1 Winchburgh/East Broxburn/Uphall — an example of where development areas can help link fragmented high-quality woodlands through urban areas and benefit biodiversity and public access.

South of Hopetoun House and the M9, between the Edinburgh-Glasgow rail line and the Union Canal, is a network of high-quality woodland between Philpstoun House and the village of Winchburgh (Figure 2). The woodland is a key piece in the jigsaw to re-establish links between woods of the long-established estates of Philpstoun, Hopetoun and Dundas to the north, and the Almond Valley to the southeast.

The Mounthooly link along the Union canal is narrow and linear and should be broadened to 150 m wherever possible to increase core-woodland habitat. Links to the Hopetoun woods could be made at Philpstoun House, and to the Carmelhill woods by expanding new native woodland either side of the railway line and M9 motorway at Myre. The CDA north of Winchburgh provides an excellent and unique opportunity to include new native woodland on its northern boundary, to help secure the future network connection through West Lothian and into western Edinburgh through Dundas and Craigmyle, and to the south through Ratho.

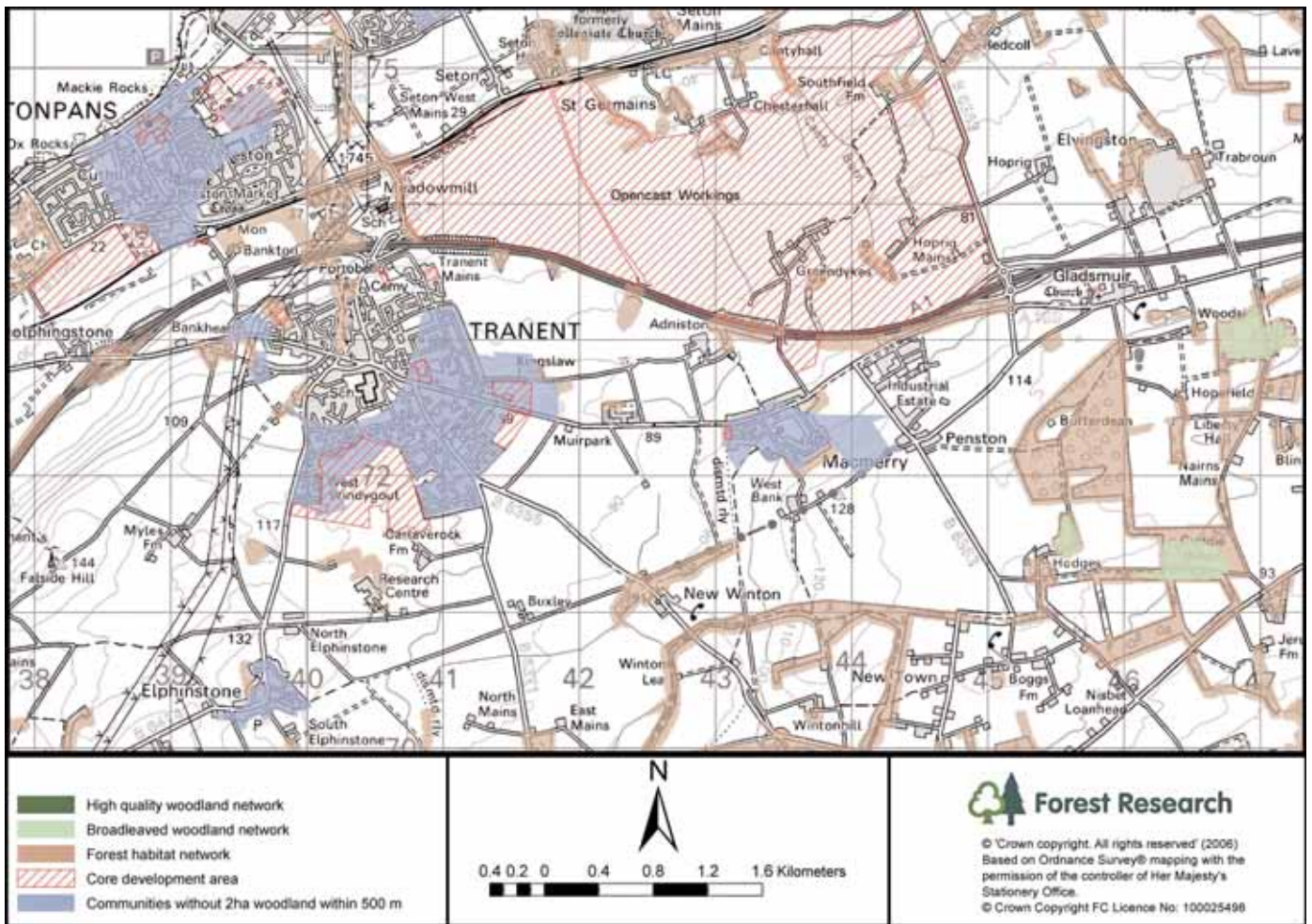


**FIGURE 3** Habitat network in an area of high woodland biodiversity along the planned Waverley railway line corridor

**2 Waverley railway line corridor — an example of high woodland biodiversity, where new woodland can link existing high-quality networks and increase accessibility to woods for new and existing communities.**

The restoration of this linkage should be given high priority to consolidate the woodland network in Midlothian. The planned Waverley line will run south from Edinburgh through Dalkeith and Newtongrange (Figure 3). The area straddles the confluence of the two prime habitat networks of the North River Esk and South River Esk in Midlothian. However, the town of Dalkeith now acts as a barrier preventing the functional linkage of many woodland-dependent species and woodland links should be made to the south of the town in one or two places.

One opportunity lies between the woodlands of Hawthornden, through Midfield, and across the southern edge of Polton and Bonnyrigg. The southern edge of the development area of Hopefield, and Poltonhall could place a section of the required link through to the high-quality woods of Dalhousie Grange, and Cockpen on the South Esk system. More woodland is required along field edges and following the lines of streams or flushes where possible.



**FIGURE 4** Habitat network in an area lacking woodland access and where development areas can substantially increase future biodiversity

**3 Blindwells — an example of an area with limited woodland access and low woodland biodiversity where development areas can substantially increase woodlands for people and future biodiversity.**

A new village is planned at Blindwells on opencast coal workings (Figure 4). The area does not support high-quality woodland, but there is a habitat network with broadleaved components to the south and east of Gladsmuir. The nearby communities do not have access to local woodland.

There is an excellent opportunity in this area to begin to develop a new woodland network along the line of both sides of the mainline railway, providing access for existing and future communities, and helping to reduce the noise and impact of the mainline railway on the expanding community. By varying the width of linear woodland, future core woodland habitat will be provided, linking existing woods south and east of Gladsmuir, and extending and improving the limited woodland in this part of East Lothian.

## Recommendations

- Opportunities exist to enhance sustainable development in each of the CDAs by managing and expanding woodland; in particular by consolidating high-quality ancient woodland networks and by providing woodlands in and around new and existing communities.
- The protection of high-quality woodland is imperative as this provides the source of woodland species that can colonise other areas. It must be safeguarded by expansion of the core woodland habitat and by bridging hostile matrix between existing woods, to reduce their isolation within the network.
- Within the urban fringe, and particularly within the CDAs, planners and developers should take every opportunity to protect existing woodland as well as adding new woodland. This will safeguard the biodiversity of the region, lessen the impact of climate change, and improve community landscapes and accessibility.
- Woodland planting on development sites should be substantial; a width of 150 m is required to eventually provide 50 m of core woodland conditions; this is the minimum recommended width for new woodland. The planting of street and ornamental trees to improve woodland biodiversity of the region will be insufficient, with development only increasing the fragmentation of neighbouring woodland habitat.

## Further reading

This document is a synopsis of the Edinburgh and the Lothians final report, which is available from the Edinburgh and Lothians page on the Forest Research website:  
[www.forestresearch.gov.uk/habitatnetworks](http://www.forestresearch.gov.uk/habitatnetworks)

## Acknowledgements

This study was funded by Scottish Natural Heritage, Midlothian Council, East Lothian Council, Edinburgh City Council and Forestry Commission Scotland, and incorporates earlier work co-funded by West Lothian Council. The authors would like to thank Chris Quine for his constructive comments.



## Contacts

Duncan Ray and Darren Moseley  
Forest Research  
Northern Research Station  
Roslin  
Midlothian  
EH25 9SY  
Email: [duncan.ray@forestry.gsi.gov.uk](mailto:duncan.ray@forestry.gsi.gov.uk)

[www.forestresearch.gov.uk](http://www.forestresearch.gov.uk)