Health Impact Assessment of Rural Development: a Guide

Scottish Health and Inequalities Impact Assessment Network (SHIIAN)

SHIIAN
ScotPHN

May 2015

Scottish Health and Inequalities Impact Assessment Network
Health Impact Assessment of Rural Development: a Guide

INTRODUCTION

All forms of development may affect health with the mechanisms or pathways by which this happens mediating both direct and indirect impacts. Some of these impacts may be different, or more significant, for development in rural rather than urban areas. An understanding of these impacts can help inform actions to enhance health benefits while mitigating health risks. The Scottish Health and Inequalities Impact Assessment Network (SHIIAN) was asked to provide advice to some work in the Highlands about the health impacts of wind farms. This work highlighted that many of the issues were not necessarily specific to wind farms but could be more generic health impacts of rural development. This guide seeks to collate available evidence on these generic health impacts. The guide should help inform health impact assessment of proposed developments and other partnership work that addresses health impacts relating to a range of types of development in rural settings.

The document contains:

- a profile of rural Scotland
- a review of impacts common to several types of development
- a summary of types of development and potential associated health hazards
- some suggested questions to help understand possible health impacts of a proposed development in a rural setting
- ways to identify and assess likely health impacts of a development
- references and sources of data
- the approach and methods used to develop this guide

Members of the steering group
Pip Farman, NHS Highland
Jenny Wares, NHS Highland
Sara Aboud, NHS Western Isles
Emelin Collier, NHS Western Isles
Linda-Leighton-Beck, NHS Grampian
Margaret Douglas, NHS Lothian/SHIIAN
Martin Higgins, NHS Lothian/SHIIAN
Phil Mackie, ScotPHN
Ann Conacher, ScotPHN

Librarian (literature search)
Julie Arnot, NHS Health Scotland

Acknowledgements
We would particularly like to thank stakeholders who participated in the workshops. Their input has been vital and we are grateful for their time and effort.

Suggested citation
Higgins M, Arnot J, Farman P, Wares J, Aboud S, Douglas MJ. Health Impact Assessment of Rural Development: A Guide. Edinburgh: Scottish Health and Inequalities Impact Assessment Network and Scottish Public Health Network (ScotPHN), 2015.

RURAL SCOTLAND

Rural Scotland accounts for over 94% of the land mass but only about a fifth of the population. More than one million people live in rural areas of Scotland. The Scottish Government urban/rural classification categorises areas according to both population size and accessibility to the nearest urban settlement. This recognises that the needs of each area are a factor of their accessibility to larger centres, not only size of the settlement. Drive-time is the measure used most commonly to capture accessibility. Most analyses use the following six-fold urban/rural classification:

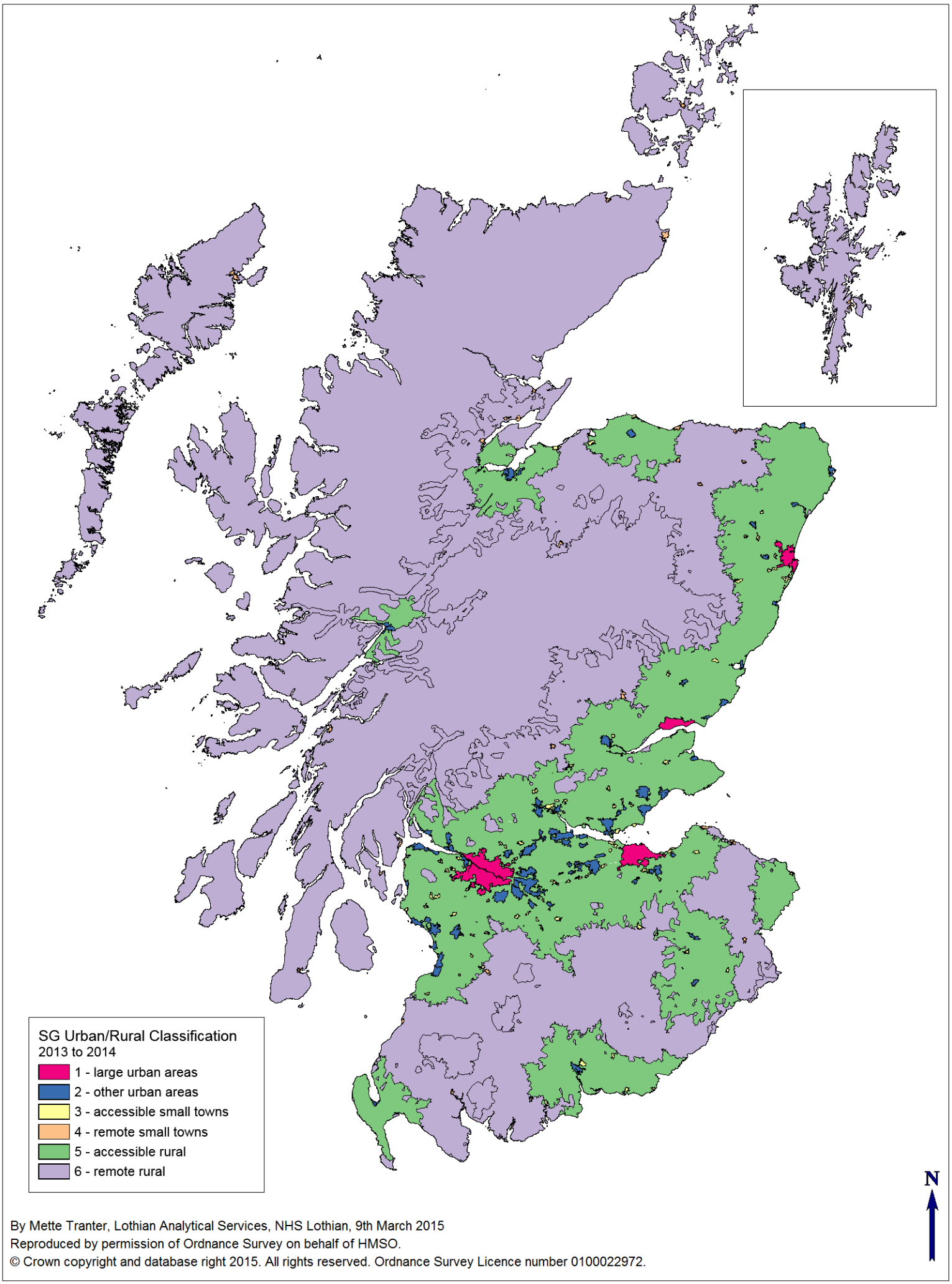
Table 1: Scottish Government Urban/Rural Classification

Class	Class Name	Description
1	Large Urban Areas	Settlements of 125,000 people and over.
2	Other Urban Areas	Settlements of 10,000 to 124,999 people.
3	Accessible Small Towns	Settlements of 3,000 to 9,999 people, and within a 30 minute drive time of a Settlement of 10,000 or more.
4	Remote Small Towns	Settlements of 3,000 to 9,999 people, and with a drive time of over 30 minutes to a Settlement of 10,000 or more.
5	Accessible Rural Areas	Areas with a population of less than 3,000 people, and within a 30 minute drive time of a Settlement of 10,000 or more.
6	Remote Rural Areas	Areas with a population of less than 3,000 people, and with a drive time of over 30 minutes to a Settlement of 10,000 or more.

As small settlements with less than 3,000 people are very common in the islands of Scotland, it is argued that the current urban-rural classifications fail to capture island living in particular.

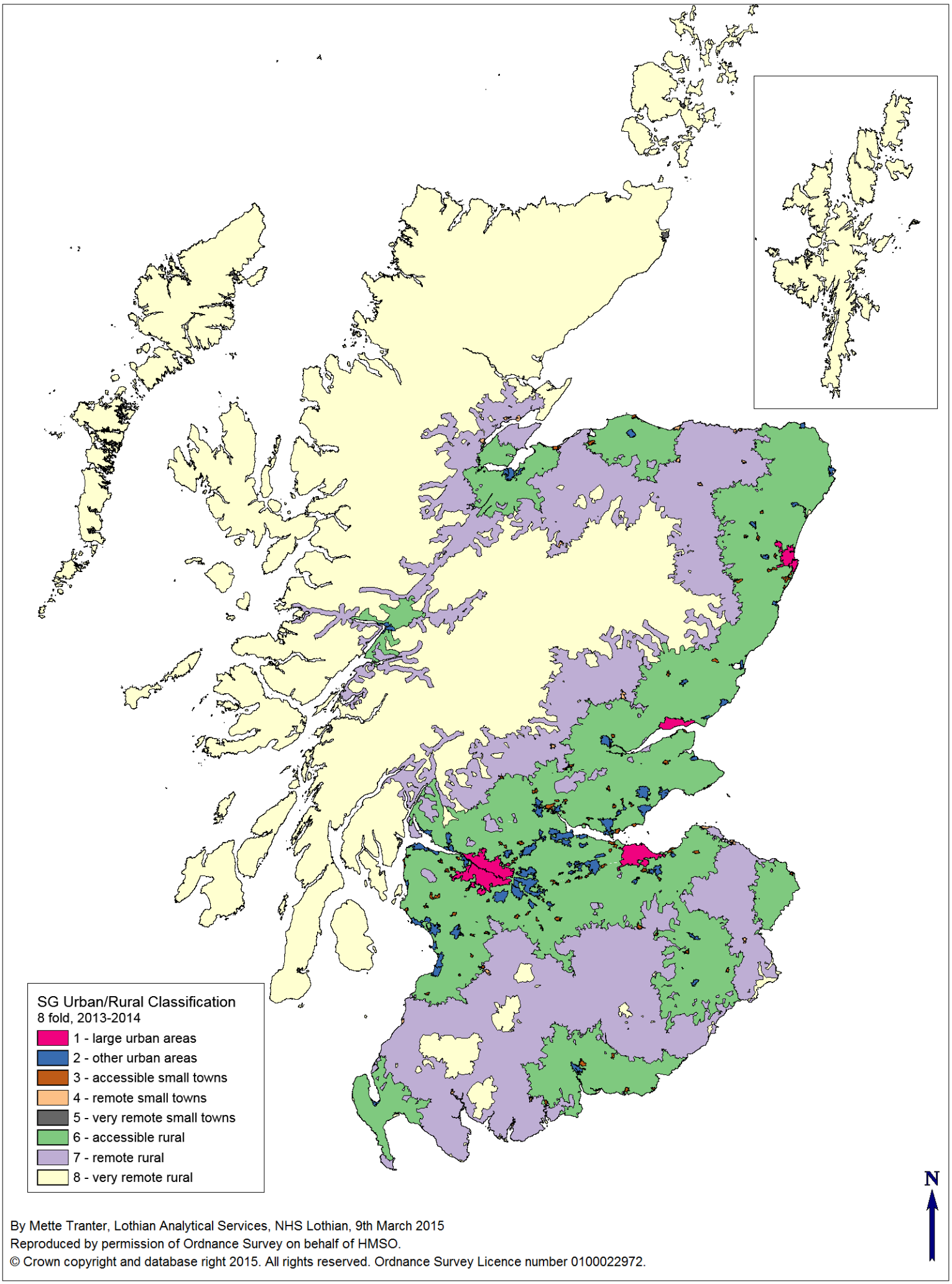
The Scottish Rural Policy Centre (SRPC) defines the following local authorities as rural: Aberdeenshire, Angus, Argyll and Bute, Dumfries and Galloway, East Ayrshire, Eilean Siar, Highland, Moray, Orkney Islands, Perth and Kinross, Scottish Borders, Shetland Islands, South Ayrshire and Stirling.

Map showing Scottish Government Urban/Rural Classification (6 fold) 2013-2014



By Mette Tranter, Lothian Analytical Services, NHS Lothian, 9th March 2015

Map showing Scottish Government Urban/Rural Classification (8 fold) 2013-2014



By Mette Tranter, Lothian Analytical Services, NHS Lothian, 9th March 2015

Not all the SRPC local authorities are entirely rural. Inverness, Perth and Stirling are cities while Aberdeen and Aberdeenshire are contiguous. But in each of these council areas, there are many people living in small settlements a considerable distance from large towns of 10,000 people or more. In fact, in Eilean Siar there are more than 280 townships with Stornoway and its suburbs the only large settlement.[1] In many remote locations, notably the islands, population is dispersed and there are very few settlements of 500 households or more.

Heterogeneity of rural areas

The rural development literature makes clear that there can be significant differences between places within rural and remote classifications.[2] The dynamics between urban and rural areas are also important. Rural areas do not exist in isolation from urban and suburban areas. An obvious example is 'counterurbanisation', the trend of people moving away from larger towns and cities to more rural areas, driven by the costs – notably housing - and other demands of living in large settlements. This is aided by new technology and improvements in transport. Although there have been concerns about gentrification and displacement of former residents as a result of counterurbanisation, researchers argue that rural communities are already heterogeneous so that gentrification of the community in this setting is less likely.[3] More robust rural economies are often those that are within an hour of a city with 250,000 residents.[4] This highlights the importance of understanding the impact of being 'remote' as well as 'rural'.

There are notable regional differences too. Although rural areas tend to have lower unemployment rates than urban areas, this is not true for East Ayrshire and South Ayrshire. While self-employment is higher in most rural areas, this is particularly so in Wester Ross and the towns in the Borders. In Orkney, parts of north east Scotland and the Borders, employment in primary industries is most common whereas tourism-related industries account for most work in the central Highlands and Skye. In the north of Scotland, Shetland and the Western Isles, construction work is the most common employment.[5] These differences often reflect the physical environment so fundamental to rurality. Some of these sectors are affected by external factors to sustain them. For example, Common Agricultural Policy (CAP) payments are crucial to the agricultural sector. Recent changes to the CAP, which favour less intensive farming approaches, are likely to affect the south of Scotland, Orkney, Campbeltown peninsula, Bute and parts of the North East which are reliant on primary agriculture.[5] Adverse weather is another unpredictable external factor that can significantly affect agriculture, tourism and food and drinks businesses.

Demography and health in rural Scotland

The rural population has been growing for many decades at a faster rate than the total Scottish population.[6] By 2013, 1,184,567 people – 22% of the Scottish population -- were living in Remote Small Towns, Accessible Rural Areas and Remote Rural Areas. In the 2011 census, the only Scottish council area to see a reduction in population was Argyll and Bute. At smaller geographies, however, the pattern is complex; although 155 settlements of less than 3,000 people increased in population size between 2001 and 2011, 25 settlements lost population.[5] Although the total rural population has increased recently, this was not the case throughout the twentieth century. For example, the population of Eilean Siar was

more than 45,000 people in 1901, fell to 26,502 in 2001 and then rose to 27,684 in 2011.[1]

The male-female sex ratio in small settlements is 93/100, which is below the average for Scotland. The population in rural areas tends to be older than the Scottish average. The average median age in rural local authority small settlements is 44.5 years compared to the Scottish average of 41 years.[5]

The ages of inward and outward migrants has an important impact on the overall age structure of rural communities. In general, young adults tend to migrate out of rural areas towards cities whereas the people migrating into rural areas tend to be older. But the proportion of 0-16 year olds in rural areas is similar to or higher than the Scotland average. Out-migration occurs between 17 and 30 years, with a pronounced difference between urban and rural areas becoming apparent in the 22 years to 26 years group. There are clear regional patterns showing that young people from the south, west and north west of Scotland migrate to Glasgow, from the north east to Aberdeen and from the south east and east to Edinburgh. Having said this, there is also a trend of movement between rural areas which is significant, notably in the north of Scotland between the Highlands, Orkney, Shetland and Moray with less strong links to Eilean Siar and Aberdeenshire.[5]

Life expectancy is higher in rural areas than other parts of Scotland. Males and females in Remote Rural Areas, Accessible Rural Areas and Accessible Small Towns all have a higher life expectancy than the average figure for Scotland.[7]

Table 2: Life Expectancy at Birth by Scottish Government urban/rural classification

Scottish Government six-fold urban/rural classification	Male Life Expectancy at Birth, 2011-2013	Female Life Expectancy at Birth, 2011-2013
Large Urban Areas	75.6	80.3
Other Urban Areas	76.6	80.6
Accessible Small Towns	77.9	81.5
Remote Small Towns	76.8	81.2
Accessible Rural	79.2	82.5
Remote Rural	79.2	82.6
Scotland	76.9	81.0

Determinants of health in rural communities

'Rural communities are often attractive for the very reasons that give rise to their problems.'[8]

There are numerous reasons why people choose to live in remote and rural areas. A higher proportion of rural residents state their neighbourhood is a 'very good' place to live, compared with the Scottish average. The crime rate is low, more people say they feel safe and rates of antisocial behaviour like vandalism are low. Sense of community and attachment to place seem to be key reasons why people choose to live in rural locations. There are high rates of volunteering and a very high proportion of people say they appreciate the sense of community in their neighbourhood. The cost of buying and renting homes is generally cheaper than equivalently sized homes in cities although other living costs are higher. These will all be part of the reason why population health is generally better in rural and remote areas and life expectancy higher.

Many health issues and impacts in rural areas are similar to those in urban or suburban locations. There are, however, a number of key issues that particularly affect health in rural communities.[9-11] Many of these interact. So, for example, the problem of lower wages in rural areas compounds the extra costs associated with reliance on motor vehicles and higher food and fuel costs. A recent systematic review sought to identify distinctive features of rural health. It found evidence that rural populations' attitudes towards health are framed in terms of independence, self-sufficiency and stoicism. The same review noted that in rural areas social norms around conformity and the fear of being stigmatised are not conducive to seeking mental health care. [12] Among the key issues we identified during stakeholder workshops (see page 26) were:

- Population – youth out-migration and ageing of the population
- Economy – lack of major employers and reliable work; lack of diversity
- Employment – 'portfolio' careers (seasonal working and seasonal/transient workforce), lower wages; lack of jobs for young people in some locations; recruitment and retention of high skill workers
- Access to Services – need to travel long distances to access services and amenities
- Physical Environment – different patterns of land use, physical terrain, water and land use
- Infrastructure – vulnerability of supply and distribution chains; higher costs
- Cost of living – fuel costs; food costs
- Resilience of people in rural communities

Many of these issues relate to the physical environment and long distances in rural areas. These pose challenges for the provision of infrastructure and services. Limited transport options mean that having a car is often a necessity. There are higher costs associated with the larger distances people and goods need to travel. Research suggests that people in rural areas spend £100 per month more on fuel than people living in urban areas. [13]

Rural poverty is significant but often hidden.[14, 15] The Scottish Index of Multiple Deprivation does not show the extent of rural poverty well because in rural areas people living in poverty are more dispersed. It has been argued that this results in

rural poverty being seen in individual rather than structural terms, which can limit effective responses.[9] The workshops and literature both identified higher costs of living in rural areas due to high living costs especially fuel, lack of public transport, and higher distribution costs. Detailed analysis of income requirements for life in remote and rural Scotland suggest that there are a number of differences between costs of living between rural Scotland and other parts of the UK as well as between rural and remote areas:

- people in remote areas pay *higher prices* for many goods, including food, household goods, petrol and clothing
- *delivery charges* for items that people are likely to order remotely add further to the cost of living
- people have to *travel further* to access services and facilities, most particularly in travelling to work, and this creates significant additional costs
- households have to *pay much more for home energy* to get the same level of comfort in remote rural Scotland than elsewhere in the UK
- the few areas where there are *lower expenses* than elsewhere, including rents, water charges, council tax and motor insurance, produce relatively minor savings in comparison with the additional costs.[16]

In 2011, it was estimated that to achieve a sufficient standard of living, a single working age adult would need to earn at least £15,600 a year in rural towns, £17,900 a year in villages and £18,600 in hamlets or remote countryside compared with £14,400 in urban areas.[17] Research from 2013 estimates that the cost of living in remote and rural parts of Scotland can be anything between 10% and 40% more than in urban areas.[16] Benefits uptake has in the past been lower in rural areas perhaps because of lack of information about availability and entitlement.[18] While employment rates are higher, the combination of lower wages and higher living costs creates a substantial working poor population.

The literature highlights the links between population, employment and rural economies. The public sector accounts for a fifth of employment in rural areas. Overall, the unemployment rate is lower in rural areas than urban areas but this figure includes people who commute, notably from accessible rural areas to an urban area. Seven percent of people in remote rural areas have a second job, compared with 4% in accessible rural areas and 3% in urban areas.

Crucially, rates of pay for people working within rural areas tend to be lower than the Scottish average, there are a greater proportion of self-employed people, and more people – women particularly - working in part-time or seasonal jobs. There are problems related both to labour market supply of skilled workers and demand in the form of jobs that people want. [19] Rural areas are, often by definition, not places where there are major industrial or employment centres. So, apart from professions, there are fewer highly skilled jobs available. In turn, there is often a shortage of people available or willing to take up skilled jobs available in rural areas. Although it is difficult to disentangle cause and effect, the problems of an unskilled labour force are compounded by the suggestion that in-job training is less common for rural workers.[4]

Average house prices in rural areas tend to be higher than in urban areas as there are more detached properties and properties with three or more bedrooms. Housing projections for rural council areas to 2037 are highest for Perth and Kinross, Stirling and Aberdeenshire – all areas with large commuter populations. Of these authority

areas, Aberdeenshire is the only one currently meeting house building targets. The economic downturn since 2008 has meant noticeably fewer housing association properties are being built in rural areas. Rural housing is more likely to have poor energy efficiency and higher fuel costs. This contributes to higher levels of fuel poverty in rural areas – as high as 46% in Remote Rural Areas in Scotland. Recent research suggests that 59% of over 60s in rural areas are fuel poor.[5]

The age profile of migrants to rural areas may influence local economies. The literature identifies different issues relating to pre-retirement and retirement migrants, with potentially different economic contributions.[20, 21] In the case of pre-retirement populations, they are seen as potential small or medium sized entrepreneurs whose skills add to the local economy.[3, 21] Affluent retirees are, in turn, viewed as people with disposable incomes who are likely to employ local services and trades and spend money locally. The evidence for these hypotheses is not, however, compelling. Research into the impact of pre-retirement migrants suggests that the economic impact associated with these individuals is limited.[22] They are often associated with self-employment and consultancy rather than small business development. As such, their entrepreneurial contribution is limited although they frequently make a positive economic contribution to rural communities. [21] There is evidence to suggest the pre-retirement group makes an important contribution to community social capital, through activities such as volunteering.[20] Thus migrants can make a positive contribution to the already strong sense of community in many rural communities.

Rural Policy

There is not an overarching rural policy for Scotland. Many national policies contain a section on rural challenges and the Scottish Government has produced a series of visions for Scotland's rural areas. Commentators suggest that:
"Policies and practices operating for rural Scotland appear not to demonstrate the same level of interconnectedness, but rather operate sectorally at Local Authority and national levels through, for example, health, education, land use, planning, transport and infrastructure remits. … There is no overall strategy for rural Scotland and all it encompasses.[5]"

Land use and spatial planning policies are good examples of the shortcomings associated with a lack of national rural policy. The hierarchical yet delegated nature of Scottish planning policy means national policies are outlined and local authorities then interpret and implement. In practice, however, significant developments in rural Scotland are not always regulated by the planning system.

Agriculture and forestry are the major land uses in Scotland's rural areas. So Scottish implementation of the Common Agricultural Policy and the Scottish Forestry Strategy are major drivers of land use change. However, the land use changes resulting from each of these do not sit fully within the formal planning framework and therefore decisions taken at an individual farm or forest level do not always reflect the economic, environmental or social aspirations for the surrounding rural communities.[5]

Another planning anomaly is the applicability of the same guidance for rural and urban housing development. A 'major' housing development is defined as one

exceeding a threshold of 50 houses. In small rural areas, smaller developments than that can constitute significant change.

There may be other discrepancies, or conflicts, between local rural policy priorities and national, or even global, policy priorities.[23] Developments that bring clear national benefits may have adverse impacts on local communities. Balancing environmental, social and economic needs in these contexts can be challenging. There are important funding and policy initiatives that do shape rural development. The Common Agricultural Policy is the most well established. The Scottish Land Use Policy and the Land Reform (Scotland) Act have significant implications for rural policy. In recent years, the EU LEADER programmes have supported the development of 'innovative solutions to rural problems which reflect what is best suited to specific territories and which actively use place-based identity.'[24] Some key policies are summarised in the table below.

Table 3: Key policies affecting rural Scotland

Policy and Legislation	Brief summary
Scottish Planning Policy (SPP) 2014	'National planning policies which reflect Scottish Ministers' priorities for operation of the planning system and for the development and use of land. The SPP promotes consistency in the application of policy across Scotland whilst allowing sufficient flexibility to reflect local circumstances.'
The Scottish Land Use Strategy 2011, revised strategy due 2016	Seeks to encourage sustainable land use in Scotland. The vision in the 2011 strategy is 'A Scotland where we fully recognise, understand and value the importance of our land resources, and where our plans decisions about land use deliver improved and enduring benefits, enhancing the wellbeing of our nation.'
The Land Reform Review Group Reported 2014	The Land Reform Review Group was appointed by Scottish Ministers to: • Enable more people in rural and urban Scotland to have a stake in the ownership, governance, management and use of land, which will lead to a greater diversity of land ownership, and ownership types, in Scotland; • Assist with the acquisition and management of land (and also land assets) by communities, to make stronger, more resilient, and independent communities which have an even greater stake in their development; • Generate, support, promote, and deliver new relationships between land, people, economy and environment in Scotland. The report made more than 60 recommendations to inform changes to the system of land ownership to promote the common good of the people of Scotland.

Policy and Legislation	Brief summary
Land Reform Bill for Scotland Announced 2014, expected to be brought before Scottish Parliament in the current term.	The Bill expected to take forward recommendations of Land Reform Review Group
Community Empowerment Bill 2014	The Bill contains a series of measures intended to empower people to influence change in their communities. These include expansion of the Community Right to Buy and measures to support Community Asset Transfer.
LEADER 2007-2013 LEADER 2014-2020	LEADER is a bottom-up method of delivering support for rural development through implementing a local rural development strategy. Support is aimed primarily at small-scale, community driven projects that are pilot and innovative in nature.
Common Agricultural Policy (CAP)	CAP is a system of agricultural subsidies and programmes covering farming, environmental measures and rural development. The whole CAP system is being restructured from 2015.
Scottish Rural Development Programme 2014-2020 (SRDP)	SRDP is a £1.2 billion programme, co-financed by the European Union and the Scottish Government, which provides a comprehensive package of support to rural Scotland delivering measures in support of economic, social and environmental priorities. The Scottish Government has allocated approximately £70 million to rural development in the 2014-15 draft budget. Pillar 1 of this funding is for farms.

COMMON HEALTH IMPACTS OF RURAL DEVELOPMENT

The workshops identified key potential common impacts that may result from any large development in a rural area and affect the health of existing and/or new residents. These are strongly related to the contextual issues affecting health in rural areas discussed in the previous section. The common areas of impact are:

- Population movement
- Psychosocial impacts
- Social capital
- Employment
- Impact on local economy
- Effects on local infrastructure – including water supplies; transport infrastructure; housing; digital communications; loss of amenity
- Changes in access to services and/or needs for new and different services
- Underpinning all of these were concerns about the magnitude of comparatively small changes in rural and remote areas with sparse populations.

We sought literature evidence for each of these. Overall, although there were some relevant prospective health impact assessments, the literature review identified very little research evidence on observed health impacts resulting from rural development. The search strategy sought evidence relating to the above areas of impact rather than specific sectors.

There was literature on the health impacts suggested above but most of this was not specific to rural settings. Key findings are considered below.

Population movement

A large development in a sparsely populated area may result in an influx of new people to the area, which is likely to change the demographic composition as well as the overall size of the population. If the new population is younger and healthier than the existing population – the 'healthy migrant effect' – this may artificially improve the overall health status of the population and mask some existing health needs. Conversely, the new population may have, or acquire, new health and social needs that existing local services are ill prepared to meet. There are sometimes concerns about antisocial behaviour, alcohol or substance misuse associated with a new population. We found little research evidence to show the extent to which this happens in practice except in the context of 'boomtowns' – notably associated with large scale mineral or energy extraction.[25, 26] Such impacts are likely to depend on the nature of the new population. An influx of new people may also bring wider impacts on local communities, as discussed below.

A new development may also cause population out-migration. This could change the composition of a community and exacerbate existing inequalities if the development is unwanted locally and those able to move away do so, leaving behind those who are unable to move for financial or other reasons.

Psychosocial impacts

Any large change to a community may bring psychosocial impacts that relate to people's perception of the change and their feelings of stress or control over it. A recent HIA publication has highlighted 'psychosocial orientation and place attachment' as an important determinant of health.[27] Psychosocial determinants are the 'socio-structural range of opportunities that are available to an individual person to meet his or her needs of wellbeing, productivity and positive self-experience'.[28] Individual factors such as locus of control, self-efficacy, resilience and other coping mechanisms influence psychosocial health and people's ability to cope with stress, but these are in turn affected by external factors. Real and perceived control of one's environment is an important mediator. For example, there is evidence that people with greater control of their working environment cope better with stress.[29] Psychosocial impacts affect both mental and physical health and there is good evidence that the biological response to stress impacts on cardiovascular and other physical health outcomes.[30] There are strong relationships between income and socioeconomic status and psychosocial health,[31] so people of low socio-economic status are more vulnerable to psychosocial stressors.

In the case of developments in rural areas, stress may arise due to perceived health hazards associated with some forms of development, or from any unwelcome change that members of the community feel is being forced on them. The distress caused by unwelcome environmental change has been termed 'solastalgia'. It is increased in communities with a strong identity and sense of place, and exacerbated by the perception of powerlessness over the change.[32, 33] Therefore, good involvement of the community in decision-making is important to mitigate these effects.

Social capital

A large development may affect social networks and have either a positive or negative effect on social capital in a community. Social capital can be defined as 'social networks and associated norms of reciprocity'.[34] Research studies consistently support a strong association between social capital and both mental and physical health. Communities with high level of social participation and cohesion have higher collective efficacy, exert more informal social control, and have higher levels of trust and reciprocity.[35] These increase both individual and collective resilience as well as general wellbeing. Social capital is often described as having different dimensions. 'Bonding' social capital consists of the strongest bonds between family and close friends. 'Bridging' social capital describes weaker ties with colleagues and acquaintances. 'Linking' social capital describes weak ties between people of different social strata, which are important to facilitate social mobility. In theory, a development could affect social capital and cohesion either positively or negatively:

- conflict within the community about a proposed development may have an adverse impact – but conversely, collective opposition or support for a proposal may bring people together.
- an influx of new people who do not integrate into existing communities may have an adverse effect on social cohesion and trust – but conversely, new people may bring wider networks and greater opportunities for 'bridging' and 'linking' social capital.

Previous HIAs have highlighted concerns about these issues but there is sparse literature evidence on the effects. There is also widespread media coverage focusing on what are generally presented as negative impacts of migration from outside the UK to smaller towns.[36] However, in practice, in rural and remote parts of the UK, migrants are often valued for their strong work ethic and their key role in filling vacancies in manufacturing, agriculture, fishing and hospitality in particular.[37, 38]. Research describes a dynamic between what workers bring to their new community and the way in which that community changes which suggests some evidence for the idea that migrants are contributing to social capital.[39]

Employment

A new development is likely to bring new employment to an area. In general this would be expected to improve the health of the people who gain new jobs. There is strong evidence that, for most people, being in work is beneficial for both physical and mental health. People who are unemployed have significantly poorer health, and this improves when they regain employment. [40]

However the quality of work is also important. Poor quality work has a less positive impact on workers' health and may even be harmful. 'Good work' is characterised by:

- Security of employment
- Sufficient variety in the work
- Employees have autonomy, control and task discretion over their work
- An appropriate balance between the efforts that workers make and the rewards that they receive
- Employees possess the skills they need to cope with periods of intense pressure
- Workplaces that are seen to be fair, where workers believe that the employer respects the principles of procedural justice[41]
- Strong workplace relationships ('work social capital')[34, 42]

The existing community will only benefit from new employment opportunities if they have the relevant skills, or can be trained to acquire them. There is often a shortage of skilled workers in rural areas – largely because there are few training opportunities in areas with fewer jobs. Large developments may require specialised skills that are unlikely to be readily available (mining, forestry, off shore servicing). Other forms of development may require lower skilled work involving long hours, shift or seasonal work (fish farming, seasonal agricultural work). There is evidence, including research on rural economies, that migrant workers from overseas are more likely to accept these low quality jobs than UK workers.[43] Labour markets in rural areas are unlikely to be able to supply sufficient workers for either of these scenarios. This means that local residents may not benefit fully from new employment and this contributes to the influx of new people noted above.

Impact on local economy

As well as the direct employment, a new development may have wider impacts on the local economy. The development may increase demand for other related goods and services, resulting in further employment opportunities. In addition, if there is an influx of new people they may spend money locally and so further support local economies. However, there is debate about the extent to which major rural developments actually result in improvements to local economies.[4] For example, substitution or displacement may occur. It is possible that one type of development – minerals for example – can have negative impacts on other industries such as tourism or agriculture.

Phimister and Roberts suggest that, 'The rural development literature has long emphasised the positive effects associated with local ownership of firms on the wellbeing and sustainability or rural communities.'[44] There are some suggestions that smaller businesses are more likely to use local supply chains and employ local workers which means that money stays within local economies. [45, 46] There is also evidence that small rural companies are more adaptive in economic downturns, using family resources in some cases.[47]

An influx of people may increase housing demand and so housing costs, and cause displacement of existing residents.[3, 48, 49] This may exacerbate existing problems associated with high costs of living in many rural communities.
We did not find any research evidence of development having other impacts on costs of living.

Local infrastructure

A new development may increase demands on local infrastructure such as water supplies, roads, digital communications[50, 51] and other infrastructure. Some forms of development may affect these directly, for example by using water for industrial processes and increasing use of the transport network. In addition, any associated increase in population may similarly increase pressure on local infrastructure, which is likely to be more vulnerable in rural areas and may cause health impacts for both existing and new populations.

Water environment

There are several ways that a development may impact on the water environment. Some industries, such as distilleries, use water as an essential ingredient. Others use water for industrial processes, such as cooling, or agricultural processes such as irrigation. Some could potentially release pollutants into water supplies. Any land use change that significantly increases hard standing may increase the risk of flooding. A population influx will increase demands for domestic water, which may be a significant issue in rural areas with more vulnerable supplies.

Transport infrastructure

A common impact arising from several types of development is increasing traffic volume resulting in increased risk of crashes, air pollution, noise, and severance effects. Increased traffic may also discourage walking and cycling and so reduce levels of physical activity. New transport infrastructure associated with the development may bring impacts that depend on the changes to traffic volume and patterns. Further guidance on health impacts relating to transport is available in *Health Impact Assessment of Transport Initiatives: A Guide* at http://www.healthscotland.com/documents/2124.aspx.

Housing infrastructure

A development that brings an influx of people may also put pressure on local housing supplies, raising costs and potentially displacing existing communities, as noted above. Any new housing may have health impacts depending on the design, quality and location of the housing. Guidance on health impacts of housing is available in *Health Impact of Housing Improvements: A Guide* at http://www.scotphn.net/pdf/2013_02_26_HIA_of_Housing_Improvements_Guide1.pdf.

Loss of amenity

Some large scale developments may bring loss of amenity, including impact on landscapes and visual impact. The health impact of this clearly depends on the nature of the amenity lost. Previous HIAs have identified potential impact on physical activity if large areas of landscape previously used for active recreation are taken up by development such as open cast mining.[52]

Local services

Population movement may change patterns of need and demand for health and other services. Rural areas often have difficulty attracting healthcare and other professionals.[53-55] There are several reasons for this, which include the preferences of individual professionals, lack of professional networks and support, the range of issues that an individual professional may need to be able to deal with and so different training needs and difficulty retaining professional expertise with a smaller number of patients or clients. If there is already a shortage of key professionals, an increase in demand may make it even more difficult for people – both existing and new residents - to access needed services.

As well as increasing overall demand, a new population moving into the area may bring different expectations and different needs. For example, some previous HIAs have highlighted potential increased needs for sexual health services where there is an influx of young, single people. In other situations there may be an influx of families that increase demand for child health and education services, and more positively may provide the critical mass to maintain schools locally. Studies of overseas migrants show that their expectations about what the health service should provide may differ, and this may affect the quality of care they receive.[56] It seems likely that service-related impacts will be very dependent on the composition of the new population and background service provision.

Magnitude of change

A concern about the magnitude of comparatively small changes in rural and remote areas with sparse populations underpins all of the issues above. This was a strong theme in the workshops, and makes intuitive sense. A moderately sized development in an urban area may not have a detectable impact on the population, local economy or needs for services. The same size of development in an area with a sparse population, few employment opportunities and more vulnerable services and infrastructure may bring more significant changes to all of these. There is also a higher risk if a single development becomes the major employer and central to the local economy – if that development comes to an end it will have significant effects on the community. This is a further reason why there is some scepticism about the benefits of inward investment from large companies, and preference for smaller scale endogenous economic growth.

SECTOR SPECIFIC HEALTH HAZARDS

Many types of development may be associated with health hazards that vary by sector. The table below provides a list of potential hazards commonly identified. They have been collated from reviewing completed HIAs of relevant developments and from other literature. Many are primarily occupational hazards for workers employed in the sector, but there are also potential impacts for local communities. The evidence of adverse health impacts from some of these impacts is contested but they may all raise public concern. It is important that any potential adverse impacts are recognised and mitigated in the planning stage of developments. The sector specific impacts listed below should be considered along with the common health impacts outlined in the previous section.

The risks to health from these hazards may depend on the effectiveness of regulatory controls. Assessing both risks and controls is likely to involve Scottish Environment Protection Agency (SEPA), the Health and Safety Executive (HSE) and other relevant agencies.

Sector	Potential hazard
Mining, including Opencast[52] [57]	• Air pollution: particulate matter, gases, dust • Noise • Light pollution • Vibration • Accidents
Oil and Gas, including unconventional extraction[25, 58-60]	• Air pollution: particulate matter, gases, dust • Water pollution • Noise • Light pollution • Naturally occurring radioactive materials • Seismic activity • Accidents
Wind energy[44, 61-67]	• Noise • Shadow flicker • Power cables and effects of Electro Magnetic Fields • Blade breakage • Accidents
Fishing and fish farming [68-71]	• Pesticides, fertilisers and other chemicals • Water pollution • Noise • Parasites and other pathogens • Accidents
Agriculture and Forestry[72]	• Pesticides, fertilisers and other chemicals • Dusts • Allergens • Zoonoses • Slurry • Noise • Vibration • Accidents

RURAL DEVELOPMENT: KEY HEALTH ISSUES

The questions below are designed to help identify the health issues that may arise from a development. These are drawn from the literature and other evidence reviewed in this document. They may be used as part of a formal health impact assessment or as part of broader partnership work that aims to ensure health issues are addressed in the planning stages. Further guidance on health impact assessment is available at http://www.healthscotland.com/resources/networks/shian.aspx and http://www.apho.org.uk/default.aspx?QN=P_HIA.

- At what stage of planning is the development? Has it been agreed? What are the timelines?
- Will the development have different operational stages – commissioning, operation, decommissioning? If so, each of the following questions may be considered for each stage.
- Is it likely that the development will attract new people to the area? If so:
    - How many people?
    - What are their demographic and other characteristics?
    - Will they be permanent or temporary residents?
    - Where are they likely to live?
- How does the local community view the proposed development? Is there conflict about the proposal?
- Have local people had the opportunity to raise any concerns and be involved in any of the decision making processes?
- What local supports are there to help new residents integrate into the existing community/ies?
- Will the development bring new employment? If so:
    - How many jobs?
    - What is their quality? (see page 16)
    - What skills are required?
    - Are these skills available in the local community? If not, will training be provided or will external workers be recruited?
- Will the development have any wider implications for the local economy – e.g. will it impact on other local services?
- What demands will the development make on local infrastructure – e.g. water supplies, energy supplies, the transport network, digital communications? Will additional capacity be required?
- What demands will new residents make on local infrastructure?
- What services are new residents likely to need? Are their needs likely to differ from existing residents?
- What is the current capacity of relevant services? E.g. Health, education
- Are there any specific health hazards associated with this type of development? (see page 20) if so, consider:
    - How many people will be exposed and how vulnerable they are
    - Length of exposure (acute or chronic, actual or perceived)
    - Cumulative impact from other developments
    - Control measures in place (existing or proposed)
    - The evidence for these health impacts
    - Community concern about these impacts

IDENTIFYING AND ASSESSING HEALTH IMPACTS

The evidence in this guide may be used to inform a formal Health Impact Assessment (HIA), and/or to inform longer term partnership work to improve the health impacts of a proposed development. In both cases, the work should consider:

- The populations who will be affected by the proposal
- The positive and negative health impacts that they will bear
- Recommendations to improve positive and mitigate negative impacts.

HIA steps

The steps involved in doing a formal HIA are well established and can be summarised as follows. Similar processes may be used more flexibly in longer term partnership work.

Step 1	Screening	Decide whether doing an HIA is appropriate
Step 2	Scoping	Set the geographical, population and time boundaries Identify affected population groups Identify areas of health impact to assess
Step 3	Set up the HIA team	Ensure appropriate expertise is included. Involve people with knowledge of the specific proposal, the relevant sector, the local area and health.
Step 4	Assess impacts	Collate evidence from range of sources to assess the likelihood and severity of the potential health impacts identified during scoping.
Step 5	Make recommendations	Use findings to recommend changes to the proposal or other changes that would improve health impacts, especially for the most vulnerable populations.
Step 6	Monitor impacts	Monitor actual impacts that arise after implementation of the proposal.

Full guidance on each of these stages is available on the Scottish Health Impact Assessment Network website at:
http://www.healthscotland.com/resources/networks/shian.aspx

Involving stakeholders

In any HIA or similar work it is important to involve stakeholders including affected communities. This is particularly so for developments that may affect people's sense of control over their environment. People may be involved in, for example, helping to identify potential impacts, in qualitative work to study how they may arise in practice, in valuing conflicting impacts and in making recommendations.

Identifying relevant impacts

This document has summarised literature relating to common areas of impact, but not all of these will be relevant to any specific proposal. The key questions presented in the previous section of this document can help to identifying relevant potential impacts. Another useful approach is to hold a workshop or meeting of stakeholders using a checklist such as that below to identify key populations and impacts.

Assessing impacts and making recommendations

Further evidence is likely to be needed to allow an assessment of the likelihood and importance of potential impacts on health. The types of evidence may include:

- A profile of the local population and features of the area(s). This should help identify the most vulnerable populations
- Views of local people and other stakeholders
- Research evidence, such as that summarised in this document
- Where an Environmental Assessment is being done, the findings may help assessment of likely health impacts.

The recommendations should be based on an understanding of the likely health impacts. They should aim to mitigate health risks and ensure maximum health benefits from the proposed development.

Scoping checklist to help identify impacts

Consider the potential impacts of the proposed development on each of the issues below. Consider both planned and unintended effects.

- Who do you think will be affected by these proposals?
- What do you think about the place you live/work in currently?
- How might the development affect it?

People

- Movement and migration (in and out)
- Population composition
- Enhancing social status and social inclusion
- Addressing discrimination and promoting equality of opportunity
- Community participation and control

Services

- Health and social care
- Leisure and recreation
- Other services such as under 5s care
- Communication (digital connectivity)
- Primary and secondary education

Transport

- Access and inclusive transport
- Encouraging walking and cycling
- Connections to services/between communities

Health and Wellbeing

- Lifestyle: physical activity, food, substance use, sexual health
- Stress and resilience

Employment and Economy

- Income (absolute and relative; individual and household)
- Economic impacts: direct and indirect
- Providing employment and training
- Ensuring financial inclusion
- Lifelong learning for all
- Living costs

Housing

- Costs (rent, mortgage)
- Quality of housing
- Mix of housing
- Internal environments

Climate

- Pollution: air/water/soil/noise
- Sustainable building techniques

Greenspace

- Greenspace access and quality
- Public spaces
- Active living
- Heritage

SOURCES OF DATA AND EVIDENCE

Scottish Parliament Rural Affairs, Climate Change and Environment Committee
http://www.scottish.parliament.uk/parliamentarybusiness/CurrentCommittees/29876.aspx
Scottish Government Land Reform Review Group
http://www.gov.scot/About/Review/land-reform/ReviewGroup
Scottish Government Land Use Strategy
http://www.gov.scot/Topics/Environment/Countryside/Landusestrategy
Scotland's Rural College Rural Policy Centre
http://www.sruc.ac.uk/info/120069/rural_policy_centre
National Records of Scotland
http://www.nrscotland.gov.uk/statistics-and-data
Scotland's Census 2011
http://www.scotlandscensus.gov.uk/
Highlands and Islands Enterprise
http://www.hie.co.uk/
Scottish Environmental Protection Agency
http://www.sepa.org.uk/
Scottish Natural Heritage
http://www.snh.gov.uk/
UHI Centre for Remote and Rural Studies
http://www.crrs.uhi.ac.uk/

APPROACH AND METHODS

A steering group oversaw the development of this guide, agreed the approach detailed below and discussed the issues identified. Members of the steering group are listed on page 3.

Scoping workshops

In order to scope the issues to include in this resource, we held workshops with stakeholders in four Health Board areas containing large rural populations. Workshops were held in Inverness, Stornoway, Aberdeen and Dumfries between November 2013 and June 2014. Colleagues in the Public Health Departments in each location organised the events and recruited participants locally. They involved people from a range of health, social care, other local authority, voluntary/community sector and academic backgrounds.
Participants in the workshops discussed a number of scenarios:

- An Energy from Waste plant
- Retail provision in rural areas
- Community windfarms
- Fish farming
- Transport issues in rural and remote areas
- New housing development in a) dormitory suburbs and b) small rural villages

From the workshops we identified a range of contextual issues that affect health in rural areas. We also identified common health impacts that may arise from different forms of development.

Critical literature review

We conducted a critical literature review seeking to answer the following research questions for each of the issues identified in the scoping workshops:

- What are the health issues that arise from these issues?
- How important are these issues for health?
- What are the likely trade-offs? – some people may benefit while others lose
- How do health impacts differ in a rural setting compared to urban setting? Eg issues relating to scale, and to vulnerability of the rural population

It should be noted that there is not an extensive research literature about health and rural development. This critical review summarises key points and themes drawn from a small number of quantitative studies and a number of detailed qualitative studies. When appropriate, evidence from wider public health literature, eg. work and health, has been used to supplement the findings relating to health and rural development.

Search strategy

A systematic approach to scoping and reviewing the literature was used in order to collate literature relating to the health effects of development in rural areas. We searched formal, academic literature and then a search of grey literature.

Academic literature

Database: Ovid MEDLINE(R) 1946 to Present with Daily Update, Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations <April 10, 2014>
Search Strategy:
1 exp Rural Health/ or exp Rural Population/ or exp Rural Health Services/ (66863)
2 exp Scotland/ (21012)
3 exp Great Britain/ (299789)
4 2 or 3 (299789)
5 exp *Air Pollution/ or exp *Environmental Pollution/ or exp *Water Pollution/ (196815)
6 exp *Unemployment/ (2598)
7 (resilience or resilient).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier] (10191)
8 (economic and impact*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier] (23109)
9 (depopulate or depopulation).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier] (663)
10 exp *"Delivery of Health Care"/ or exp *Health Services Accessibility/ or exp *"Health Services Needs and Demand"/ or exp *Health Services/ (1192604)
11 (traffic or transport).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier] (496011)
12 exp *"Emigrants and Immigrants"/ (3821)
13 ("wind farm*" or "hydro-electric" or "off mains gas" or "sustainable energy" or "fuel poverty").mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier] (373)
14 (invest* or disinvestment or decommission* or "job loss*").mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier] (2282371)
15 exp *"Conservation of Energy Resources"/ or exp *Renewable Energy/ (9214)
16 exp *Economics/ (259370)
17 infrastructure.mp. (14903)
18 community ownership.mp. (75)
19 exp *"Conservation of Natural Resources"/ or exp *Social Welfare/ or exp *Ecosystem/ or exp *Socioeconomic Factors/ (222227)
20 exp *Biodiversity/ (12086)
21 exp *Construction Industry/ (262)
22 exp *Work/ (8334)
23 ("critical mass" and population).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier] (51)
24 (communit* and engage*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol

supplementary concept word, rare disease supplementary concept word, unique identifier] (8183)
25 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 (4296622)
26 4 and 25 (117587)
27 1 and 26 (920)
28 limit 27 to yr="2004 -Current" (367)

Web of Science 2004-2014

#7	343	#5 AND #4 **Refined by: PUBLICATION YEARS:** (2006 OR 2005 OR 2012 OR 2008 OR 2011 OR 2013 OR 2004 OR 2010 OR 2009 OR 2007 OR 2014) Timespan=All years Search language=Auto
#6	374	#5 AND #4 Timespan=All years Search language=English
#5	Approximately 159,544	**TOPIC:** (england or scotland or wales or "northern ireland" or "great britain" OR UK or "united Kingdom") Timespan=All years Search language=English
#4	1,681	#2 AND #1 **Refined by: COUNTRIES/TERRITORIES:** (ENGLAND OR SCOTLAND OR WALES OR NORTH IRELAND) Timespan=All years Search language=Auto
#3	Approximately 14,077	#2 AND #1 Timespan=All years Search language=English
#2	Approximately 2,982,932	**TOPIC:** (unemploy* OR "job loss" or pollut* or economic* OR resilien* or service* or traffic or transport or migrant* or immigrant* or Biodiversity or depopulat* or infrastructure or "wind farm*" or "hydro-electric" or "off mains gas" or "sustainable energy" or "fuel poverty" or disinvestment or decommission* or energy or population or ownership) Timespan=All years Search language=English
#1	Approximately 28,813	**TITLE:** (rural) Timespan=All years Search language=English

The search produced 710 references. The authors then screened titles for relevance. This narrowed the selection to 74. These articles were then screened by abstract. Additional references were identified from reference lists of key articles.

Grey literature

Websites Browsed / Searched

- Scottish Government Publications – search for ‘rural’
- UK Government Publications – search for ‘rural’
- SRUC – browse of publications pages
- Centre for Rural Health – Aberdeen University
- IPPR
- ESRC
- NIESR
- JRF
- EHRC
- Scottish Parliament - Rural Affairs Committee
- ETHOS – BL thesis service
- Highlands and Islands Enterprise
- Scottish Enterprise
- Highlands Council
- Scotland: National Rural Network

The following are searches of google advanced, with the aim of identifying ‘research’ documents (in PDF format) generated by agencies within the UK.

Migrant Workers

- service* migrant* AND immigrant* OR migration* OR immigration "rural " filetype:pdf
- GP* migrant* AND immigrant* OR migration* OR immigration "rural " filetype:pdf
- "health service*" AND migrant* OR immigrant* OR migration* OR immigration "rural " filetype:pdf
- impact migration AND migrant* OR immigration OR immigrant* "rural" filetype:pdf
- "public services" AND migrant* OR immigration OR immigrant* "rural" filetype:pdf
- NHS AND migrant* OR immigrant* OR migration* OR immigration "rural " filetype:pdf
- migrant* rural
- migration* rural
- migrant* workers rural scotland filetype:pdf
- migration rural scotland filetype:pdf
- A8 Scotland filetype:pdf

Services/Access to Services

- rural service* Scotland filetype:pdf
- rural access service* scotland filetype:pdf

Disinvestment

- scotland unemploy* OR job OR disinvestment OR decommissioning OR "job loss*" "rural " filetype:pdf

Economy/Economics/Socio-economics /Poverty

- economic* "rural" scotland filetype:pdf
- economic* shock* "scotland rural " filetype:pdf
- economic* dislocat* "scotland rural " filetype:pdf

Traffic/Transport

- rural scotland traffic OR transport OR train OR bus OR car filetype:pdf
- traffic rural scotland filetype:pdf
- increas* traffic rural scotland filetype:pdf
- transport rural filetype:pdf
- Browse of Transport Scotland
- Browse of Scottish Government Publications

Depopulation/critical mass AND population

- depopulat* rural "scotland " filetype:pdf
- critical mass scotland rural population filetype:pdf

Community/Communities/Ownership

- scotland community OR communities "rural" filetype:pdf
- scotland rural "ownership" filetype:pdf
- infrastructure rural "scotland " filetype:pdf

Energy

- energy "rural " filetype:pdf
- scotland rural "wind farm*" filetype:pdf
- wind farm* scotland "rural" filetype:pdf
- renewable* energy scotland "rural" filetype:pdf
- sustainable energy scotland "rural" filetype:pdf
- "fuel poverty" scotland "rural" filetype:pdf
- Hydro electric scotland "rural" filetype:pdf
- off mains gas "scotland " filetype:pdf

Ethos – BL Thesis Service

- Rural AND Scotland

Review of HIAs and selected guidance

We reviewed Health Impact Assessment reports on the HIA Gateway that assessed a specific development in a rural setting. We also reviewed guidance that related to the impacts of specific sectors. We restricted both of these to developed country contexts. For each of the reports we identified: the type of development; specific hazards; indirect health impacts and pathways.

References

1. Comhairle nan Eilean Siar. *Factfile -- population*. 2015 [cited 2015 23 February, 2015]; Basic population trends]. Available from: http://www.cne-siar.gov.uk/factfile/population/.
2. Hodge, I. and S. Monk, *The economic diversity of rural England: stylised fallacies and uncertain evidence.* Journal of Rural Studies, 2004. **20**(3): p. 263-272.
3. Stockdale, A., *The diverse geographies of rural gentrification in Scotland.* Journal of Rural Studies, 2010. **26**(1): p. 31-40.
4. Agarwal, S., S. Rahman, and A. Errington, *Measuring the determinants of relative economic performance of rural areas.* Journal of Rural Studies, 2009. **25**(3): p. 309-321.
5. Skerratt, S., et al., *Rural Scotland in Focus 2014*, in *Rural Scotland in Focus*2014, Rural Policy Centre, SRUC, Scotland's Rural College: Edinburgh.
6. Scottish Government, *Rural Scotland Key Facts 2012*, R.a.E.S.a.A.S. Division, Editor 2012, Scottish Government: Edinburgh.
7. National Records of Scotland, *Life Expectancy for Areas within Scotland 2011- 2013*, 2014, NRS: Edinburgh.
8. Manthorpe, J., et al., *Elderly people's perspectives on health and well-being in rural communities in England: findings from the evaluation of the National Service Framework for Older People.* Health & Social Care in the Community, 2008. **16**(5): p. 460-468.
9. Asthana, S., J. Halliday, and A. Gibson, *Social exclusion and social justice: a rural perspective on resource allocation.* Policy and Politics, 2009. **37**(2): p. 201-214.
10. Asthana, S. and A. Gibson, *Rationing in response to NHS deficits: rural patients are likely to be affected most.* BMJ, 2005. **331**(7530): p. 1472.
11. Asthana, S. and J. Halliday, *What can rural agencies do to address the additional costs of rural services? A typology of rural service innovation.* Health & Social Care in the Community, 2004. **12**(6): p. 457-465.
12. Gessert, C., et al., *Rural definition of health: a systematic literature review.* BMC Public Health, 2015. **15**(1): p. 378.
13. The Poverty Alliance, *Rural Poverty*, in *EPIC Briefing*2012, The Poverty Alliance: Glasgow.
14. Pacione, M., *The geography of disadvantage in rural Scotland.* Tijdschrift Voor Economische En Sociale Geografie, 2004. **95**(4): p. 375-391.
15. Moffatt, S. and N. Glasgow, *How Useful is the Concept of Social Exclusion When Applied to Rural Older People in the United Kingdom and the United States?* Regional Studies, 2009. **43**(10): p. 1291-1303.
16. Hirsch, D., et al., *A minimum income standard for remote, rural Scotland*, in *A Minimum Income Standard for the UK*, C.f.R.i.S. Policy and F. Joseph Rowntree, Editors. 2013, Highland and Islands Enterprise: Inverness.
17. Smith, N., A. Davis, and D. Hirsch, *A minimum income standard for rural areas*, in *A Minimum Income Standard for the UK*, F. Joseph Rowntree, Editor 2011, Joseph Rowntree Foundation: York.
18. Shucksmith, M.D., et al., *Disadvantage in rural Scotland*, in *Social Policy Research*1994, Joseph Rowntree Foundation: York.
19. Kalantaridis, C., *In-migration, entrepreneurship and rural urban interdependencies: The case of East Cleveland, North East England.* Journal of Rural Studies, 2010. **26**(4): p. 418-427.
20. Philip, L., M. Macleod, and A. Stockdale, *Retirement Transition, Migration and Remote Rural Communities: Evidence from the Isle of Bute.* Scottish Geographical Journal, 2013. **129**(2): p. 122-136.

21. Stockdale, A., L. Philip, and M. MacLeod, *Retirement transition migration: Implications for rural development.* Journal of Rural and Community Development Journal, 2013. **8**(3): p. 303-320.
22. Stockdale, A. and M. MacLeod, *Pre-retirement age migration to remote rural areas.* Journal of Rural Studies, 2013. **32**(Journal Article): p. 80-92.
23. Mann, C. and P. Jeanneaux, *Two Approaches for Understanding Land-Use Conflict to Improve Rural Planning and Management.* Journal of Rural and Community Development [Online], 2009. **4**(4).
24. Shucksmith, M.D., *Future Directions in Rural Development: Executive Summary*, 2013, Carnegie Trust: Dunfermline.
25. Birley, M., *Health impact assessment: principles and practice*2011, London: Earthscan.
26. Wynveen, B.J., *A thematic analysis of local respondents' perceptions of Barnett Shale energy development.* Journal of Rural Social Sciences, 2011. **26**(1): p. 8-31.
27. Baldwin, C., *Assessing impacts on people's relationships to place and community in health impact assessment: an anthropological approach.* Impact Assessment and Project Appraisal, 2014. **33**(2): p. 154-159.
28. Siegrist, J. and M. Marmot, *Health inequalities and the psychosocial environment—two scientific challenges.* Social Science & Medicine, 2004. **58**(8): p. 1463-1473.
29. Bosma, H., et al., *Low job control and risk of coronary heart disease in whitehall ii (prospective cohort) study.* BMJ, 1997. **314**(7080): p. 558.
30. McLean, J., et al., *Early life socioeconomic status, chronic physiological stress and hippocampal N-acetyl aspartate concentrations.* Behavioural Brain Research, 2012. **235**(2): p. 225-230.
31. Pickett, K.E. and R.G. Wilkinson, *Income inequality and health: A causal review.* Social Science & Medicine, 2015. **128**(0): p. 316–326.
32. Albrecht, G., et al., *Solastalgia: the distress caused by environmental change.* Australas Psychiatry, 2007. **15 Suppl 1**: p. S95-8.
33. Warsini, S., J. Mills, and K. Usher, *Solastalgia: living with the environmental damage caused by natural disasters.* Prehosp Disaster Med, 2014. **29**(1): p. 87-90.
34. Putnam, R.D., *Bowling alone: The collapse and revival of American community*2001: Simon and Schuster.
35. Kawachi, I. and L. Berkman, *Social cohesion, social capital, and health.* Social epidemiology, 2000.
36. Caviedes, A., *An Emerging 'European' News Portrayal of Immigration?* Journal of Ethnic and Migration Studies, 2015: p. 1-21.
37. McCollum, D., *Investigating A8 migration using data from the Worker Registration Scheme: Temporal, spatial and sectoral trends.* Local Economy, 2013. **28**(1): p. 35-50.
38. de Hoyos, M. and A. Green, *Recruitment and retention issues in rural labour markets.* Journal of Rural Studies, 2011. **27**(2): p. 171-180.
39. Vergunst, P.J.B., *Whose Socialisation? Exploring the Social Interaction Between Migrants and Communities-of-Place in Rural Areas.* Population Space and Place, 2009. **15**(3): p. 253-266.
40. Waddell, G. and A.K. Burton, *Is work good for your health and wellbeing?*, DWP, Editor 2006, The Stationery Office: London.
41. Kivimäki, M., et al., *Effort-reward imbalance, procedural injustice and relational injustice as psychosocial predictors of health: complementary or redundant models?* Occupational and Environmental Medicine, 2007. **64**(10): p. 659-665.
42. Constable, S., et al., *Good Jobs*, 2009, The Work Foundation: London.

43. Green, A.E., et al., *Rural Development and Labour Supply Challenges in the UK: The Role of Non-UK Migrants.* Regional Studies, 2009. **43**(10): p. 1261-1273.
44. Phimister, E. and D. Roberts, *The Role of Ownership in Determining the Rural Economic Benefits of On-shore Wind Farms.* Journal of Agricultural Economics, 2012. **63**(2): p. 331-360.
45. Courtney, P., G. Hill, and D. Roberts, *The role of natural heritage in rural development: An analysis of economic linkages in Scotland.* Journal of Rural Studies, 2006. **22**(4): p. 469-484.
46. Courtney, P., D. Lepicier, and B. Schmitt, *Spatial patterns of production linkages in the context of Europe's small towns: How are rural firms linked to the local economy?* Regional Studies, 2008. **42**(3): p. 355-374.
47. Phillipson, J., et al., *Adaptive responses and asset strategies: the experience of rural micro-firms and Foot and Mouth Disease.* Journal of Rural Studies, 2004. **20**(2): p. 227-243.
48. Brasier, K.J. and M.R. Filteau, *Residents' perceptions of community and environmental impacts from development of natural gas in the Marcellus Shale: a comparison of Pennsylvania and New York cases.* Journal of Rural Social Sciences, 2011. **26**(1): p. 32-61.
49. Petkova, V., et al., *Mining Developments and Social Impacts on Communities: Bowen Basin Case Studies.* Rural Society, 2009. **19**(3): p. 211-228.
50. Howick, S. and J. Whalley, *Understanding the drivers of broadband adoption: the case of rural and remote Scotland.* Journal of the Operational Research Society, 2008. **59**(10): p. 1299-1311.
51. Tookey, A., J. Whalley, and S. Howick, *Broadband diffusion in remote and rural Scotland.* Telecommunications Policy, 2006. **30**(8-9): p. 481-495.
52. Chadderton, C., E. Elliott, and G. Williams, *A guide to assessing the health and wellbeing impacts of opencast mining*, 2011, Wales HIA Support Unit: Cardiff.
53. Sim, A.J., *Locum tenens consultant doctors in a rural general hospital - an essential part of the medical workforce or an expensive stopgap?* Rural & Remote Health, 2011. **11**(4): p. 1594.
54. Richards, H.M., J. Farmer, and S. Selvaraj, *Sustaining the rural primary healthcare workforce: survey of healthcare professionals in the Scottish Highlands.* Rural & Remote Health, 2005. **5**(1): p. 365.
55. Prior, M., et al., *More than health: the added value of health services in remote Scotland and Australia.* Health & Place, 2010. **16**(6): p. 1136-1144.
56. Sime, D., *'I think that Polish doctors are better': Newly arrived migrant children and their parents' experiences and views of health services in Scotland.* Health & Place, 2014. **30**(0): p. 86-93.
57. Metals, I.C.o.M.a., *Community health programmes in the mining and metals industry* 2013, ICMM: London.
58. Kovats, S., et al., *The health implications of fracking.* The Lancet, 2014. **383**(9919): p. 757-758.
59. Finkel, M.L. and A. Law, *The rush to drill for natural gas: a public health cautionary tale.* Am J Public Health, 2011. **101**(5): p. 784-5.
60. Barron, T., M. Orenstein, and A.L. Tamburrini, *Health Effects Assessment Tool (HEAT): An Innovative Guide for HIA in Resource Development Projects*, 2010, Habitat Health Impact Consulting & Environmental Resources Management: UK.
61. Superior Health Council of Belgium, *Public health effects of siting and operating onshore wind turbines.* , 2013, Superior Health Council: Brussels.
62. Chapman, S., *Editorial ignored 17 reviews on wind turbines and health.* BMJ, 2012. **344**.
63. Hanning, C.D. and A. Evans, *Wind turbine noise.* BMJ, 2012. **344**.

64. Horner, B., R.D. Jeffery, and C.M.E. Krogh, *Literature Reviews on Wind Turbines and Health.* Bulletin of Science, Technology & Society, 2011. **31**(5): p. 399-413.
65. Munday, M., G. Bristow, and R. Cowell, *Wind farms in rural areas: How far do community benefits from wind farms represent a local economic development opportunity?* Journal of Rural Studies, 2011. **27**(1): p. 1-12.
66. van der Horst, D. and D. Toke, *Exploring the landscape of wind farm developments; local area characteristics and planning process outcomes in rural England.* Land Use Policy, 2010. **27**(2): p. 214-221.
67. Knopper, L., et al., *Wind turbines and human health.* Frontiers in Public Health, 2014. **2**.
68. Watterson, A., et al., *Scoping a Public Health Impact Assessment of Aquaculture with Particular Reference to Tilapia in the UK.* ISRN Public Health, 2012. **2012**: p. 18.
69. Watterson, A., et al., *Towards Integration of Environmental and Health Impact Assessments for Wild Capture Fishing and Farmed Fish with Particular Reference to Public Health and Occupational Health Dimensions.* International Journal of Environmental Research and Public Health, 2008. **5**(4): p. 258-277.
70. Erondu, E. and P. Anyanwu, *Potential hazards and risks associated with the aquaculture industry.* African Journal of Food, Agriculture, Nutrition and Development, 2004. **4**(13).
71. Myers, M.L., *Review of Occupational Hazards Associated With Aquaculture.* Journal of Agromedicine, 2010. **15**(4): p. 412-426.
72. Health and Safety Executive, *A guide to farming risks, potential problems with public safety and how to avoid accidents*, 2012, Health and Safety Executive: DEFRA.

For further information contact:

ScotPHN
c/o NHS Health Scotland
Meridian Court
5 Cadogan Street
Glasgow
G2 6QE

Email: nhs.healthscotland-scotphn@nhs.net

www.scotphn.net
www.healthscotland.com