TRANSPORT SCOTLAND

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A90 Dualling
Balmedie to Tipperty

Volume 1
Environmental Statement

August 2007

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A90 Dualling, Balmedie to Tipperty
Environmental Statement

This Environmental Statement comprises:

- Non-Technical Summary

- **Volume 1 – Main Statement**
  including the Non-Technical Summary

- Volume 2 – Environmental Statement Figures

ENVIRONMENTAL STATEMENT

PROPOSED DUALLING OF THE A90: BALMEDIE TO TIPPERTY

Environmental Statement

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natural CAPITAL

ENVIRONMENTAL STATEMENT

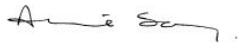
PROPOSED DUALLING OF THE A90: BALMEDIE TO TIPPERTY

Environmental Statement

August 2007

For and on behalf of
Natural Capital Ltd.

Approved by: Dr Annie Say

Signed: 

Position: Director

Date: 18.07.07

PROPOSED DUALLING OF THE A90: BALMEDIE TO TIPPERTY

ENVIRONMENTAL STATEMENT
NON-TECHNICAL SUMMARY

INTRODUCTION

This document is the Non-Technical Summary of the Environmental Statement for the improvement of the single carriageway section of the A90 trunk road[1] north of Aberdeen between Balmedie and Tipperty, which is proposed by Transport Scotland. The proposal is for an off-line dual carriageway which would link into the current dual carriageway sections to the south at Balmedie and north at Tipperty (see Figure 1). The scheme is programmed to open in 2012/2013.

ENVIRONMENTAL IMPACT ASSESSMENT

Transport Scotland is publishing draft Road Orders[2] and draft Compulsory Purchase Order to seek powers to build the new scheme. An environmental impact assessment of the proposals is required under the Environmental Impact Assessment (Scotland) Regulations 1999 because of the scale of the proposals and the potential for significant effects.

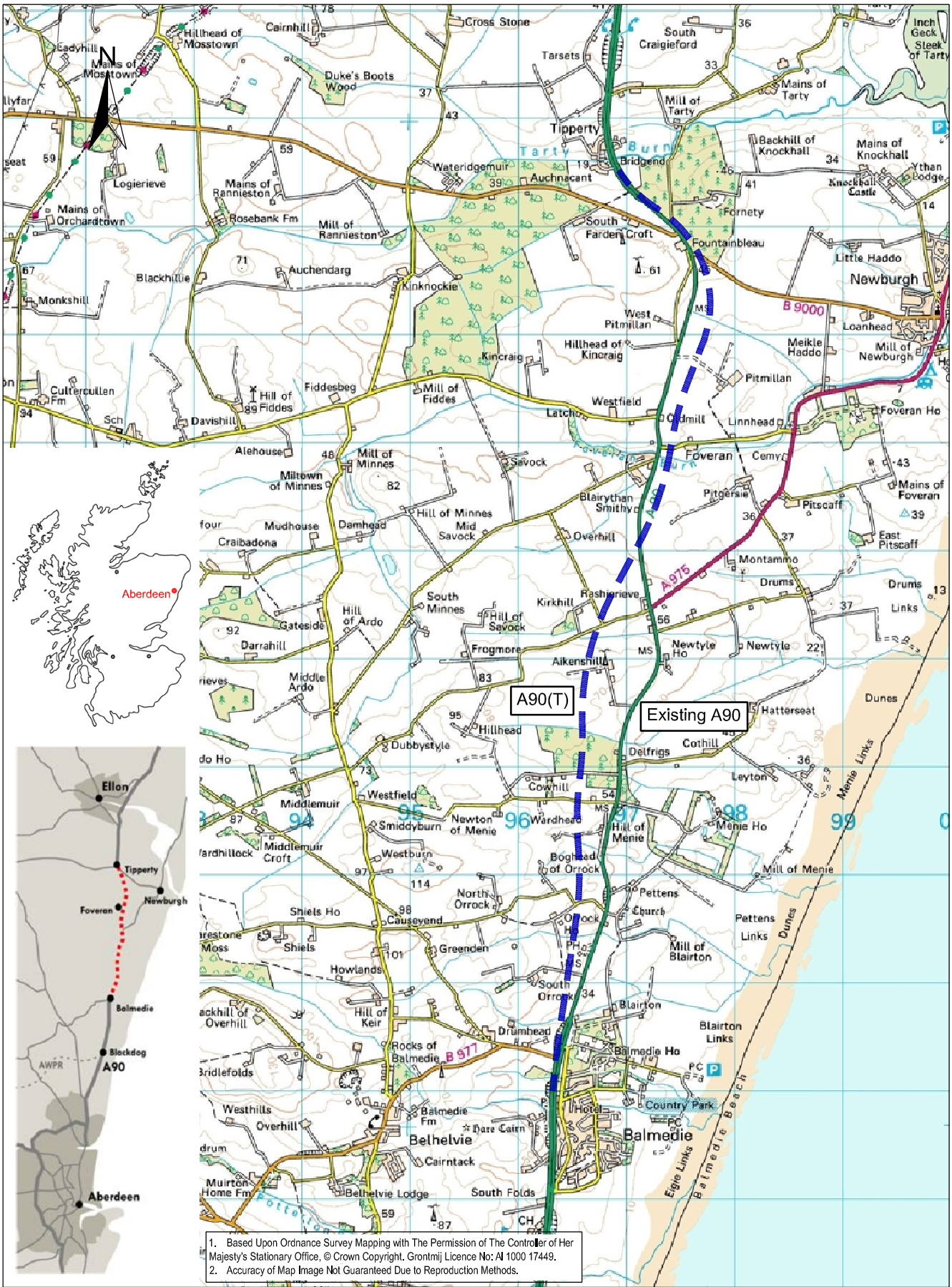
Scottish Natural Heritage (SNH) has requested that information is collated as part of the environmental impact assessment process to inform an appraisal of the potential effects of the proposals on the Ythan Estuary which is a site of European value for nature conservation designated under the Conservation (Natural Habitats, &c.) Regulations 1994 as a Special Area of Conservation (SAC) and a Special Protection Area (SPA).

The findings of the environmental impact assessment and details about the project including mitigation commitments (measures that would be implemented to avoid, reduce or remedy adverse environmental impacts) are presented in an Environmental Statement. This Non-Technical Summary summarises the findings of the environmental impact assessment and other key information contained in the Environmental Statement.

The environmental impact assessment has been informed by consultations with a wide range of organisations and landowners. This information and the findings of the assessments have been used to help develop the design for the scheme by

[1] A trunk road is a road which falls within the responsibility the Scottish Ministers

[2] Roads orders are published by the Scottish Ministers under the Road (Scotland) Act 1984 as the statutory development consent process for construction and operation of the trunk road. The orders show the line of the road. A compulsory purchase order (CPO) is the means whereby land can be acquired by Transport Scotland. Draft Orders are initially published and a period of consultation follows. Any objections or comments received by Transport Scotland on behalf of the Scottish Ministers are taken into account in making the decision about whether the proposals should be approved and the orders made. If any objections cannot be resolved there may be a Public Local Inquiry at which the objections are examined further by a Reporter who makes a recommendation about whether the proposals should proceed. All this information is taken into account when the Scottish Ministers make their final decision about whether the scheme should proceed



1. Based Upon Ordnance Survey Mapping with The Permission of The Controller of Her Majesty's Stationary Office, © Crown Copyright. Grontmij Licence No: AI 1000 17449.
2. Accuracy of Map Image Not Guaranteed Due to Reproduction Methods.

Key:

Existing A90

Proposed Route (A90(T))

Drawn by: CG	Checked by: AS	Date: 08/07

A90 Dualling - Balmedie to Tipperty

Location Map

NTS Figure 1

Scale 1 : 50 000 at A4

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ensuring that wherever possible adverse effects to people and to the natural environment would be avoided and environmental benefits delivered.

NEED FOR THE SCHEME

The existing A90 trunk road is part of the main transport corridor connecting Aberdeen with Peterhead and Fraserburgh. The road is dual carriageway from Aberdeen to Balmedie and again north of Tipperty to the A948 junction leading to Ellon.

The annual average daily traffic flow on the road is 20,000 vehicles per day, and the existing single carriageway section is not capable of providing efficient access to and from the north of Aberdeen, particularly at peak periods. This problem is likely to get worse in future years. This would affect all users including cars, freight and bus services. With the route being at capacity there will be increased journey time unreliability and incidents and accidents can further add to congestion. The road in its current layout has many side road junctions and accesses allowing local traffic to join the trunk road and this too has an impact on through-traffic.

SCHEME OBJECTIVES

The scheme objectives against which the proposals have been assessed are:

- to improve strategic and local accessibility on the A90 route corridor between Balmedie and Tipperty for all types of road users;
- to improve the movement of traffic on the A90 between Balmedie and Tipperty in order to aid economic prosperity and development in the north east of Scotland;
- to improve road safety on the A90 between Balmedie and Tipperty;
- to minimise intrusion of the new works on the natural environment, cultural heritage and people and to enhance the local environment where opportunities arise; and
- to facilitate integration along the A90 corridor by providing opportunities for more reliable public transport.

SCHEME BACKGROUND AND ROUTE OPTIONS

Studies into upgrading the existing road to dual carriageway have been ongoing since the 1980s. In 1996 draft Orders were published although these proposals were not taken forward at that time because it was decided by the Scottish Executive that major road schemes should be re-examined as part of the Scottish Strategic Roads Review. The findings of the review, published in 1999, were that the A90 Balmedie to Tipperty scheme should be held in abeyance and

considered alongside other emerging priorities for a future trunk road programme which would be appraised using a multi-modal approach.

A multi-modal appraisal following Scottish Transport Appraisal Guidance (STAG) was subsequently undertaken that assessed transport problems associated with the users of the A90 corridor between Balmedie and Tipperty. The appraisal was objective led and a key finding was that platoons of traffic regularly form along the section behind slow moving vehicles.

In June 2005, following consideration of the STAG report, the then Minister for Transport announced that the offline dual carriageway option with grade separated junctions should be progressed to design stage. Following this decision Transport Scotland[3] and their consultants reviewed the proposals in the context of current design standards, environmental constraints and legislation, together with comments received following the publication of the previous draft Orders. As part of that process various sub-options were identified, appraised and consulted on at a public exhibition in June 2006. A preferred scheme, different from that originally published in the 1996 draft Orders was identified to be taken forward, and this is the scheme appraised in detail in the Environmental Statement.

THE PROPOSALS

The proposals (described from south to north) include:

- a nine kilometre (km) section of new dual carriageway, with two lanes in each direction, each 7.3 metres (m) in width and with hard 1m strips and 2m verges on each side of the road and a 2.5m minimum central reserve. The design speed of the new road would be 120 kilometres per hour (kph);

- three grade separated junctions to allow access on and off the new road at the following locations:

    - to the south of Balmedie replacing the existing at-grade junction. The new junction would provide all-ways access from Balmedie village and also connect to a realigned B977 Dyce Road;
    - at Rashierieve, which would allow access between the A975 Newburgh Road and the A90(T) to the south. The junction would also allow access on to the local road network; and
    - south of Tipperty which would allow access between the B9000 and the new A90(T) to the north as well as allowing for connections to the local road network.

- closure of the existing gaps in the existing dual carriageway from south of Balmedie to the south of Tipperty so that local traffic would use the new junctions to access or cross the dual carriageway;

- various structures to carry local roads over or under the A90(T);

[3] Transport Scotland is the national transport agency for Scotland. Its purpose is to help deliver the Scottish Executive's vision for transport.

- some local road realignments including:
    - realignment of the B977, Dyce Road, from Drumhead to the new junction at Balmedie south. Access to the properties at The Holdings, south of Keir Farm would be via this B977 realignment;
    - a link road from Easter Hatton to the exit from Blackdog Rifle ranges to allow access on to the A90 because the existing gap in the central reserve would be closed;
    - a link road from the East Aberdeenshire Golf Course to the new junction at Balmedie to allow access to the A90 for properties at South Folds, Millden and the golf club because the gap in the central reserve would be closed;
    - the existing A90 would be de-trunked and realigned at Balmedie to join with the Old Road which runs north south through the village;
    - the local road from Orrock House and Boghead to the existing A90 would be realigned and linked to the existing A90 via the new Orrock Overbridge;
    - the track between Hill of Menie Croft and the Hill of Menie would be stopped up and a new access provided onto the new road which would lead to the proposed Dambrae Underpass;
    - the local access to Stoneyards would be upgraded to the west of the A90(T);
    - localised realignment of the minor roads at Kirkhill to link with the new A975 junction;
    - the A975 would be realigned to link into the new A975 grade separated junction. The existing A90 would continue past Rashierieve to tie-in to the realigned road allowing access to be maintained to Southlea and the steel fabrication yard;
    - an off-line realignment of the minor road from the existing A90 east of Foveran by means of an overbridge. The new works would tie in to the existing road immediately west of the Mill of Foveran;
    - realignment of the current access to Pitmillan Pig Farm from the existing A90 would be stopped up and access provided via the proposed Pitmillan Overbridge;
    - provision of a new link from the southern end of Tipperty village to the B9000 Pitmedden Road allowing access to the local network since the existing access to the A90 would be closed.

- culverts to carry existing watercourses under the new road including tributaries of the Blairton and Menie Burns, the Sandend Burn and the Foveran Burn and lade. A small tributary of the Foveran Burn would require some realignment. Ledges to allow animal passage would be included in these culverts;

- construction of a road drainage system including eight detention ponds for the treatment of road run-off and any accidental spills;

- where required safety fences, lighting, signs and laybys on the new road;

- use of low noise road surfacing and construction of noise barriers and bunds;

- landscape planting (trees, shrubs and grassland).

The existing A90 between Balmedie and Tipperty would be retained and de-trunked to become part of the local road network maintained by Aberdeenshire Council.

DELIVERING THE PROPOSALS

If at the conclusion of the statutory process it is found that the scheme should be taken forward there would be competitive tendering process (for a Design and Build or similar contract) to select a preferred contractor for the scheme. The winning contractor would develop the outline design shown in the Environmental Statement to detailed design stage and construct the works in accordance with requirements set out in the contract. These would include all the committed environmental mitigation described in the Environmental Statement.

As a result of this approach some details of the scheme are not yet defined and therefore construction assumptions and design details have been used for the purposes of environmental impact assessment based on best available information. Should the scheme and/or methods of construction differ from those assumed in the Environmental Statement, Transport Scotland, as scheme promoter, would consider whether the new proposals could result in any significant adverse effects different from those of the current design and construction assumptions. If the potential for significant effects was identified then an addendum to the ES would be required and this would be published for public comment and consideration by Scottish Ministers.

CONSTRUCTION

The scheme would take some 18-24 months to build. It has been assumed that construction activities would be undertaken during the daytime (08.00 to 19.00 Monday to Friday and 8.00 to 13.00 on Saturday). Occasional night and Sunday working would be required for some activities (e.g. carriageway tie-ins) to minimise traffic disruption on the local road network. Noise limits would be controlled by requirements in the contract documents.

Construction activities would include earthworks and land forming for embankments and cuttings, erecting structures such as bridges and culverts, installing drainage networks, road surfacing, signing and lighting etc. These activities would create additional traffic movements and some activities would require traffic management measures.

Land made available to the contractor in the contract could be used for a site compound and to store material and equipment. If the contractor wanted to use additional land outwith the scheme corridor necessary permissions and licences would have to be acquired by the contractor.

The scheme once operational would be maintained by a maintenance contractor (currently BEAR) on behalf of Transport Scotland.

EFFECTS OF THE PROPOSALS

The environmental effects of the proposals are summarised in the following sections and also on Figure 2.

Policy and Planning

The proposed scheme broadly complies with National Government guidance and the area Structure and Local Plan policies. Mitigation has been defined for any potentially significant impact on the environment to ensure that any residual effects are reduced to the minimum for safe implementation of the proposals. A sensitive approach to mitigating effects on the settings of designated properties, especially Orrock House, an A Listed Building, and Hare Cairn a Scheduled Ancient Monument, would ensure that any potential impact to the setting of important historic features within the scheme area has been reduced to that necessary for the works.

The scheme has been designed to take account of future development in Balmedie, Foveran and Tipperty, however, a small parcel of land designated in the local plan for employment use and strategic landscaping (0.93ha) would be lost to the south of Balmedie.

Traffic

It is anticipated that scheme construction could be undertaken with minimal disruption to existing traffic on the road network. Whilst some disruption is inevitable, traffic management strategies would be planned in advance and implemented to minimise disruption. There would be some local traffic effects where the new road crosses existing roads.

The proposed dualling from Balmedie to Tipperty would provide a continuous dual carriageway running from Aberdeen to Ellon and improve the strategic transport network in the area. Its construction would provide additional capacity to eradicate platooning effects experienced on the existing route. The traffic on the existing A90 would reduce from 23,700 Annual Average Daily Traffic (AADT) to approximately 600 AADT in the southern section and 20,200 AADT to 1,300 AADT in the northern section. The provision of the new infrastructure would improve the reliability of journeys for all users, including freight and public transport services.

Land Use and Property

The proposals are located in an area of rolling farmland that falls gently, from west to east, down towards the coastline and extensive dune system of the Foveran and Menie Links and the Ythan Estuary. The key land use in the area is intensively managed farmland, a mix of arable and pasture. There are three main villages (Balmedie, Foveran and Tipperty) in the scheme area as well as scattered hamlets, and settlements consisting predominantly of traditional single and one and a half storey cottages and farmsteads.

There are two formal Rights of Way in the scheme corridor, both within the Fornety plantation. These would not be directly affected by the scheme. The B977 is used as a walking route to and from Balmedie to access facilities in the village and Belhelvie Church. Walkers have to cross the busy existing A90 using the central reserve at the north end of Balmedie. There is also informal use of the area for recreation although the A90 is a barrier, particularly for horse riders.

There would be a loss of 0.12 hectares from the gardens of three houses at South Folds and 0.021 hectares of garden from No 6 The Holdings. Some 0.61 hectares would be lost from East Aberdeenshire Golf Club, which would include the driving range. Other effects on land uses are considered to be minor as no properties would be demolished and there would be no other land take from residential properties, community land or businesses other than farms. Access would be maintained for all residences, community facilities and businesses during construction and operation of the scheme. Appropriate signage would be provided to warn drivers and other users of potential diversions and delays during construction.

A new footpath would be created between Balmedie and Drumhead via the Kier Farm underpass and general access on and across the A90 would be improved for recreation by the provision of bridges and underpasses on the new road and the reduction in traffic on the existing road.

Agriculture, Forestry and Sporting Interests

The range of agricultural activity in the corridor varies from intensive livestock and arable farming to more extensive cattle and sheep systems. The type of activity and the level of intensity are determined by a number of factors including the land capability. Although there is no known commercial shooting within the study corridor there is rough shooting.

Twenty eight agricultural, commercial forestry and sporting land interests would be affected by the proposed development which collectively farm some 1,994 hectares. The proposed development has adverse residual effects (moderate or above) on 20 land interests (71%). The viability of one unit, Seven Acres, would be compromised which would have one third of its land (4.23 hectares) lost to the proposed scheme and 2.05 hectares (16%) severed. Agricultural and equestrian activities would be compromised.

In total some 117.68 hectares of agricultural and commercial forestry land would be subject to compulsory purchase to construct the proposed scheme of which some 16.80 hectares would be available to be returned to agriculture reducing the net loss of agricultural land to 100.88 hectares. Of the net agricultural land

affected by the project, 20.72 hectares (21%) would be Class 3_1 land[4] (prime land), 68.37 hectares would be Class 3_2 (non-prime land) and 11.87 hectares would be in woodland and commercial forestry. A small amount of this land would be retuned to agriculture after construction has finished.

Geology and Soils

No sites designated for their geological interests would be affected by the proposals. No geological resources or soils of particular significance have been identified which would be affected by the works and no significant effects are predicted. No significant areas of contaminated land have been identified which could be affected by the works. Implementation of best management practices including good design of the detailed works would ensure that any impacts were reduced to the minimum necessary for the safe implementation of the works.

Drainage and the Water Environment

The general drainage in the area is from west to east to the coastline. There are no major watercourses or water bodies in the area which would be directly affected by the proposals. The majority of watercourses in the area of the scheme are small burns which drain eastwards towards the coast including tributaries of the Millden and Menie Burns, and the Sandend and Foveran Burns. Burns from Foveran to the north drain into the River Ythan Estuary which is designated for its European and national nature conservation interests.

Mitigation measures would be implemented to ensure that there would be no significant residual effects on, or changes to the hydrological and hydrogeological environments within the corridor. Best practice measures to prevent pollution would be implemented during construction, (including the storage and handling of hazardous materials, the management of site run-off and the management of site compounds and domestic sewage), waste disposal and site restoration. The construction of the scheme is not therefore predicted to result in significant adverse effects. There is potential to affect a borehole at Pitmillan Pig Farm and if this was the case compensation and appropriate mitigation would be agreed with the landowner.

The outline drainage design for the scheme has been designed in accordance with best practice with detention ponds, filter drains and other sustainable urban drainage systems (SUDS) and it is not predicted that any significant adverse impacts on surface water and groundwater quality would occur as a result of the routine operation of the scheme. These mitigation measures would also help to mitigate the impacts from extreme pollution events. The detention ponds would have capacity to hold large volumes of run-off and contaminated water, allowing time for pollution response plans to be implemented and resultant cleanup to take place. These measures would ensure the risk of pollution to the Ythan Estuary would not be significant.

[4] The capability of land to support different types of agricultural systems, from intensive arable cropping to more extensive pasture based systems, is determined by a range of physical factors such as relief and topography, climate (rainfall and growing season) and soil characteristics. Land is classed by the Macaulay Land Use Research Institute (MLURI) according to its land capability, reflecting the above conditions

Ecology and Nature Conservation

The route corridor is rural in character with farmland (arable and pasture), scattered settlements and a number of small watercourses and ditches draining west east to the sea. Woodland and hedges in the area are sparse with the exception of shelterbelts associated with farms and other properties, small groups of mainly deciduous trees and shrubs, and small areas of young mixed plantation forestry. There are extensive sand dunes at the coast and an important estuary (the Ythan) east of Newburgh (some 3km from the scheme) which is designated for its European and national nature conservation interests. The corridor provides habitat for a variety of birds and other animals.

No habitats or plant species of particular note have been identified in or in proximity to the route corridor. Generally the habitats along the route are common in the area and of limited nature conservation value. Their loss is not considered to be significant. Habitat creation includes approximately 11.8 hectares of native woodland and scrub planting; 53.9 hectares of grassland including some wildflower grassland; and eight new detention ponds (3.1 hectares) with associated wetland habitat. A variety of birds have been identified as breeding in the scheme corridor or in proximity to it but no significant effects to any have been identified. The new landscape proposals have been designed to provide a range of habitats for birds and other animals and have potential to enhance local biodiversity in the longer term.

Badger and otter activity has been identified along the route corridor. Both are protected species. Otter is considered only to pass through the area and no badger setts have been located within 30m of the proposed scheme. Suitable mitigation would be implemented during construction and otter and badger passes and fencing would be incorporated into the detailed design of the scheme to reduce the potential for severance effects from the new road.

Implementation of best management practices during construction and design and implementation of effective drainage features including detention ponds and other SUDS measures would ensure that there were no indirect effects on the Ythan Estuary. The integrity of the European sites (Special Area of Conservation; Special Protection Area and Ramsar site) would not be affected by construction or operation of the scheme.

Landscape and Visual

The area between Balmedie and Tipperty is part of the North-East Lowlands, a gently undulating, low-lying plain, dominated by intensive farming and stretching from Aberdeen to the Moray Firth. There are no nationally designated areas of landscape value within the study area. The coast from Balmedie north to the estuary of the Ythan and beyond is locally designated as an 'Area of Landscape Significance' and as 'Undeveloped Coast'. Menie House and Balmedie House are both in the 'Extended Inventory of Gardens and Designed Landscapes for Gordon District'. Although close to the proposed road, neither is directly affected by it.

The proposed road runs through a rural landscape. It is generally small scale and rolling in the area south of the ridge at Aikenshill. North of this ridge, the landscape becomes much broader, more open and large scale. Development is concentrated at Balmedie, Foveran and Tipperty but there is a broad scatter of individual and groups of houses throughout the area.

In the southern half of the area, the new road would create a strong north-south feature in a landscape which has a generally east-west grain. In the northern half of the area, the new trunk road would run parallel to the existing road reinforcing the north-south axis which already exists.

Few strong landscape elements (such as woodlands) would be affected by the new road, although the pattern of small field boundaries in the southern half of the area would be disrupted.

The scattered nature of development leads to a similar scattering of visual effects. As far as possible, the new road has been designed to sit low in the landscape and, in particular, all junctions have been designed so that the main road with its high load headroom requirements passes over the side roads. This has minimised the extent to which structures stand up in the open landscape and has reduced the potential visual effect of the junctions. In most situations the degree of visual impact is more related to the proximity of the new road and its intrusion into a rural or semi-rural landscape rather than to the actual obstruction or blocking of views by the road or structures.

The new road would have a moderate adverse effect on the landscape of the southern half of the study area during the construction period. At a more local scale, there would be a major adverse effect during the construction period on the landscape of the more enclosed and self-contained valleys such as that to the west of The Holdings and the valley of the Menie Burn around Dambrae. These effects would all reduce over time as the mitigation matures, such that the eventual overall landscape effects would be minor, although in local areas they would remain moderate.

The road when new would have a major adverse visual effect on No 6 The Holdings, on the Cock and Bull restaurant and the two adjacent cottages, on Seven Acres and Stoneyards Cottages, and on Blair Lodge at Kirkhill. In all cases, apart from at No 6 The Holdings, the visual effect would reduce to moderate adverse as the mitigation planting matures and partially screens the traffic.

There would be moderate adverse visual effects from the scheme, when new, at the clubhouse for the East Aberdeenshire Golf Club, South Folds and the Holdings; at Old Road in Balmedie; to most of the properties west of the old road and within about 300m of the new road from Balmedie to Hill of Menie, including Orrock House (see Figure 3); to Stoneyards and Cowhill; to the line of houses at Aikenshill and; to Mill of Foveran and Ardgill. Where mitigation planting is proposed, this effect would generally reduce over time to minor adverse. On the other hand in the open landscapes where screen planting would be inappropriate,

such as at Orrock House and at Aikenshill, this effect would remain unchanged except in so far as perceptions of change reduce as the viewer gets used to the new view.

There would be moderate beneficial effects on most of the properties immediately abutting the existing A90 when traffic transfers to the new road. At The Bungalow, just north of Balmedie, there would be a moderate beneficial effect when the mitigation planting on the site of the grubbed up old road has developed.

Archaeology and Cultural Heritage

There are some 90 sites of archaeological or historic interest in a study corridor 300m either side of the proposals (1km for protected sites). Ten of the sites have statutory protection. Temple Stones (1km west of the Easter Hatton link) and Hare Cairn (north of the B977 link road) are Scheduled Ancient Monuments. Eight are listed buildings (Orrock House (A listed) and Gatepiers (B listed); Belhelvie Old Parish Church; Orrock House Dovecot; Menie House and Lodge; and Mill of Foveran (all B listed) and Balmedie House Lodge and Balmedie House (C listed). Research into the historical background of the area shows that the area has undergone substantial pre-historic and historic development and this would indicate that there is the possibility for further unidentified archaeology in the area. Construction would have a direct physical impact on six sites of local importance (these do not have statutory protection).

There would be moderate adverse effects on the settings of Hare Cairn and Orrock House, minor adverse effects on Orrock House Dovecot and Mill of Foveran, no effect on four of the protected sites, a minor beneficial effect on Belhelvie Old Parish Church and a moderate beneficial effect on Menie House Lodge.

Where sites could not be avoided they would be excavated (if required) and recorded. Any impacts on unidentified archaeology (discovered before and during construction) would be mitigated by survey, excavation and recording.

Disruption due to Construction

Construction activities would potentially result in an increase in journey times and some disruption to local and commuting traffic. It has been assumed that all construction activities would be carried out using haul roads internal to the scheme in order to minimise the impact of construction traffic. Traffic management proposals for areas where the works cross exiting roads would be developed by the contractor to minimise impacts wherever possible.

Existing View

View with A90(T)

Drawn by: KM	Checked by: AJF	Date: 08/07

A90 Dualling - Balmedie to Tipperty

Landscape Impact Photomontages
View towards Orrock House

NTS Figure 3

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Noise and Vibration

The key noise source in the area of the proposals is existing road traffic and this would continue once the new works were built. Noise mitigation has therefore been integral to the iterative design process for the scheme balancing the opportunity to reduce noise at nearby properties with potential landscape and visual impacts of bunding and barriers.

There would be temporary noise and vibration effects during construction mainly associated with temporary construction works and traffic diversions. Contract requirements would require noise levels to be kept to the minimum possible by implementing best practice.

There would be some increases in noise at properties without the scheme as a result of general traffic growth, although there would be reductions on the B977 because of lower traffic flows in that area if the Aberdeen Western Peripheral Route is constructed.

Noise effects as a result of the scheme are predicted to range from major beneficial to major adverse, with the majority of properties in the corridor subject to minor effects (non-significant). Overall, close to the scheme following its opening and including for general traffic growth, greater noise level decreases are predicted than noise level increases at local properties. Some properties have been identified that could qualify for noise insulation measures through the provisions of the Noise Insulation (Scotland) Regulations.

Noise level changes at important designated historic sites are predicted to range from moderate adverse to major beneficial, with greater beneficial effects being predicted overall.

Air Quality

Air quality within the route corridor is good. Concentrations of all pollutants typically associated with transport are well within statutory objectives.

Impacts during construction would be minimised by implementing best management practices on site and overall effects are predicted to be minor adverse (not significant).

The main impacts when the scheme was operational would be changes in the total emissions of pollutants and changes in local concentrations of pollutants. In general, the scheme would bring positive effects with regard to air quality at local properties. Seventy five properties within the study corridor would experience minor beneficial effects on air quality due to the scheme and 11 would experience minor adverse effects. Concentrations at all properties would remain well within the statutory objectives.

Pedestrians, Cyclists, Equestrians and Community Effects

Access for all properties would be maintained or alternative provisions made during construction and in the final scheme. During construction some temporary adverse effects would result from required diversions. There would be a permanent increase in journey time from some properties to community facilities because of the road realignments required to accommodate the scheme. However there would also be some benefits for pedestrians, cyclists and equestrians from provision of grade-separated crossing facilities over the new road and by the decrease in traffic on the old road. New footways would be created to link Balmedie with the community facilities in Drumhead and the East Aberdeenshire golf course. Footways would be constructed adjacent to the new access roads to the Holdings and the East Aberdeenshire Golf Club.

Vehicle Travellers

There would be moderate benefits for drivers in terms of travelling time and driver safety because the new road would eliminate platooning of traffic and fully allow for overtaking. This would reduce driver stress.

The scheme would provide attractive views from the road for drivers where other requirements (noise and landscape and visual mitigation) allow. New woodland and other landscape planting would provide additional interest for drivers.

CUMULATIVE EFFECTS

The proposed mitigation measures would ensure that cumulative impacts from any other likely development in proximity to the corridor would not be significant. The results of the flood risk assessment indicate that no cumulative impacts to flooding are likely to occur from the development of the scheme. The appraisal indicates there would be no significant risk of impacts to the Ythan Estuary.

Residents in proximity to the proposals could be affected by a combination of traffic, air quality, noise and reduction in amenity effects both during construction and also when the scheme is operational. There would be some short-term effects in the wider corridor during construction with changes in traffic movements on local roads because of diversions to facilitate construction where the new road crosses existing roads and visual effects at the same time from construction plant etc. In the longer term the scheme has been designed to ensure that it would fit well in the landscape and that environmental effects (intrusion, noise etc) would be adequately controlled to ensure effects were reduced to the minimum necessary for safe implementation of the works.

No other major proposals have been consented and therefore no significant effects from the combined effects of this project with other proposals are predicted.

REVIEW AND COMMENTS

The Environmental Statement and copies of the draft Orders can be viewed during normal working hours at:

- Transport Scotland
  Trunk Roads: Infrastructure and Professional Services
  Buchanan House
  58 Port Dundas Road
  Glasgow
  G4 OHF

- Aberdeenshire Council Offices
  Woodhill House
  Westburn Road
  Aberdeen
  AB16 5GB

- Balmedie Library
  Eigie Road
  Balmedie
  Aberdeenshire
  AB23 8YF

The Environmental Statement can also be viewed on Transport Scotland's website: www.transportscotland.org.uk.

The Environmental Statement comprises the main text and also this Non-Technical Summary (NTS) which is bound into the front of the main text and also available as a free-standing document.

Copies of the Environmental Statement are available in hard copy for £150 or on CD for £10 (both including postage and packing). VAT is chargeable on CDs. The NTS (which is available free of charge) and the main ES are available from the Director of Trunk Roads Infrastructure and Professional Services (address as above) at Transport Scotland.

Comments on the proposals or their environmental effects can be sent in writing to the Director of Trunk Roads Infrastructure and Professional Services at Transport Scotland within six weeks of the date of publication of the notice for the Environmental Statement.

Easter Hatton Link

Wester Hatton Timber Yard

New hedge to divide Link from A90 and add biodiversity

Easter Hatton Detention Pond

Easter Hatton Landfill Site

Tributary of Millden Burn

Remnants of existing walls taken down and stone reused in new walls

B977 Realignment

Stone wall providing noise mitigation

Footway provided from the Holdings and Golf Club to Old Road

Mitigation of impact on golf course to be the subject of a detailed design study

Mitigation of impact on gardens to be the subject of a detailed design study

Mitigation of impact on garden to be the subject of a detailed design study

East Aberdeenshire Golf Club

Temple Stones

Millden

Existing A90

Millden Link Road

South Folds

Moderate adverse visual effect

The Holdings

No 6 The Holdings

Major adverse visual effect

Easter Hatton

Bairnie Hillock

Central reserve gaps in A90 to be closed eg at Millden

Burn de-culverted and open water bodies created if possible

Loss of land marked for development

Balmedie Junction

Old Road

Millden Burn

Balmedie Detention Pond

Semi-formal entrance to village

Balmedie

Tributary of Millden Burn

To Aberdeen

To Ellon

Key:

- Existing woodland
- Watercourse
- Proposed CPO Line
- Individual / specimen tree planting
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- Wildflower seeding
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- False cutting
- Embankments graded out for return to agriculture
- Scheduled Ancient Monument
- Listed Building

Drawn by:	Checked by:	Date:
KM	AJF	08/07

A90 Dualling - Balmedie to Tipperty

Enviromental Effects and Mitigation Measures

Sheet 1 of 8

NTS Figure 2

Scale 1 : 5000 at A3

TRANSPORT SCOTLAND

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Hare Cairn

Hedgerow with groups of standard trees

B977 Realignment

Dyce Road Detention Pond

Remnants of existing walls taken down and stone reused in new walls

Eigie Burn

Tributary of Eigie Burn

Belhelvie Church

Drumhead

Victoria Hall

Garage

Drumhead Cottage

Unnamed Burn

Keir Farm

Alignment of footpath to be subject of detailed design study to avoid impact on existing woodland

Noise barrier and hedge, clumps of woodland to reduce landscape impact of noise barrier

New footpath to Drumhead

Drumhead Lodge

Stone wall

Balmedie Lodge

Old roads would be grubbed up and returned to agriculture, subject to landowner's agreement

The Bungalow

Moderate visual benefit

South Orrock Detention Pond

Existing A90

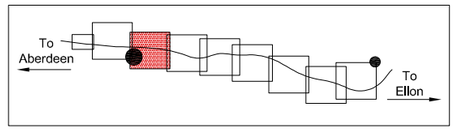
Significant block of woodland on the line of the abandoned old road, with linear glades to accommodate retained services

Ponds to provide attenuation for run-off from the road

Eigie Road

Blairton

Balmedie House



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A90 Dualling - Balmedie to Tipperty

Enviromental Effects and Mitigation Measures

Sheet 2 of 8

NTS Figure 2

Scale 1 : 5000 at A3

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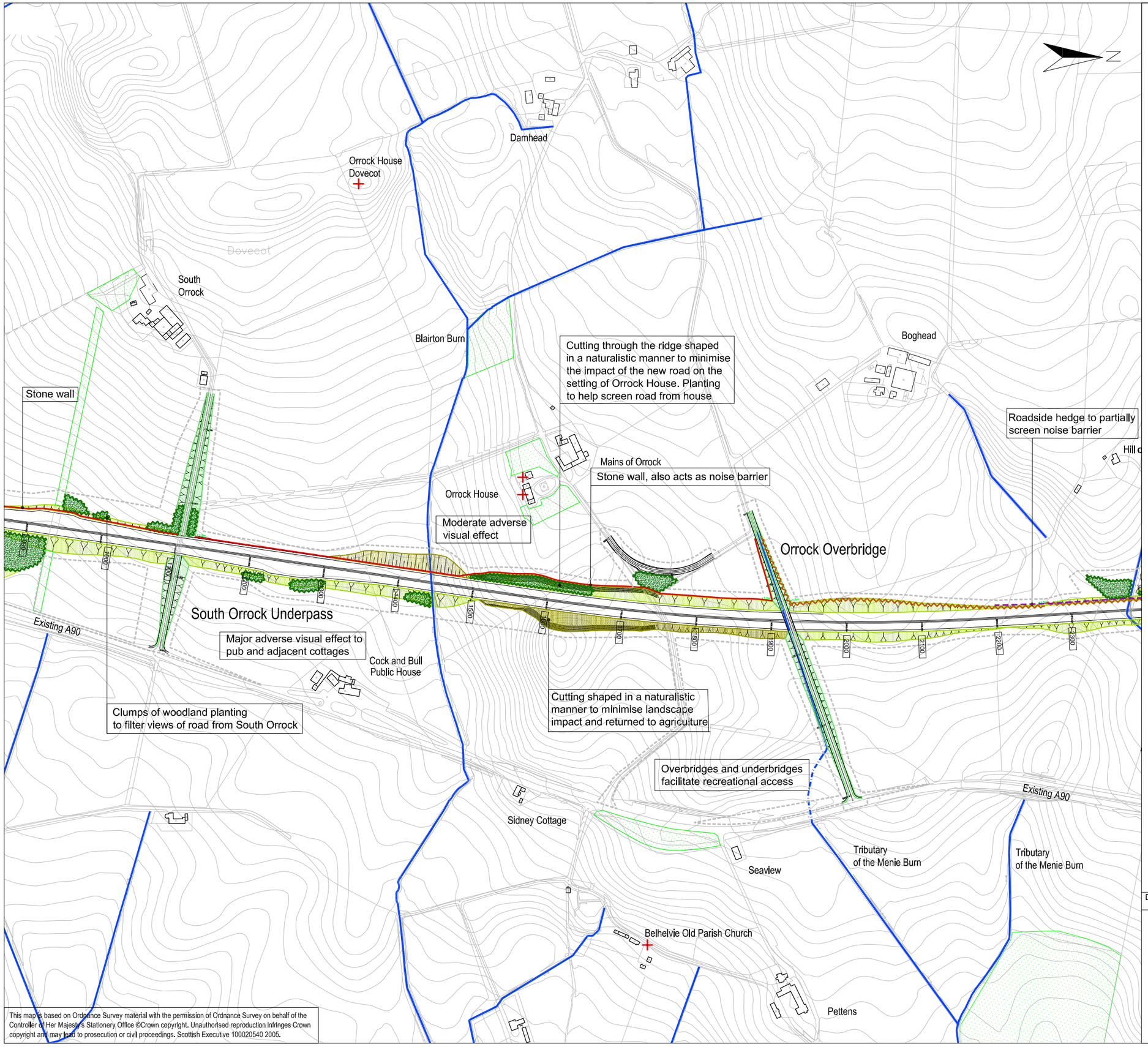

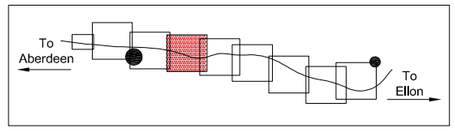

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A90 Dualling - Balmedie to Tipperty

Enviromental Effects and Mitigation Measures
Sheet 3 of 8

NTS Figure 2
Scale 1 : 5000 at A3

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Scrub and shrub planting on false cutting to screen the new road and noise barriers

Moderate adverse visual effect

Cowhill

Wardhead

Major adverse visual effect

Seven Acres

Roadside hedge to partially screen noise barrier

Hill of Menie Croft

Height and slope of false cutting to vary to give gently undulating profile when seen from the old A90

Stoneyards

Major adverse visual effect

Noise barrier to reduce noise at Stoneyards

Noise disbenefits at properties close to new A90(T)

Design includes measures to protect otter and badger

Dambrae Underpass

Dambrae

Dambrae Detention Pond

Hill of Menie

Shrub/scrub planting on the false cutting to retain views from cottages

Landform to be created to provide a noise barrier of naturalistic appearance

Existing A90

Tributary of the Menie Burn

Tributary of the Menie Burn

Tributary of the Menie Burn

Sandend Burn

Bog Roy

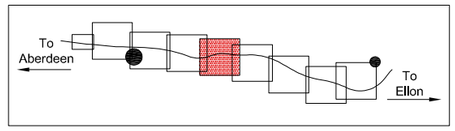
Delfrigs

Existing A90

Menie Lodge

Summerlee

Menie House



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A90 Dualling - Balmedie to Tipperty

Enviromental Effects and Mitigation Measures

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NTS Figure 2

Scale 1 : 5000 at A3

TRANSPORT SCOTLAND

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Noise disbenefits at properties close to new A90(T)

Design includes measures to protect otter and badger

Mixed woodland planting on false cutting to screen the new road and noise barriers

Attractive view from road to sea

Kirkhill

Blair Lodge

Major adverse visual effect

Shrub/scrub planting at the end of false cutting to retain views from Blair Lodge

Landform to be created to provide a noise barrier of naturalistic appearance

Underpass to mitigate severance of farm

Moderate adverse visual effect at cottages

Aikenshill

Existing A90

Noise and severance benefits from reductions in traffic on A90

Unnamed Burn

Newburgh Road Junction

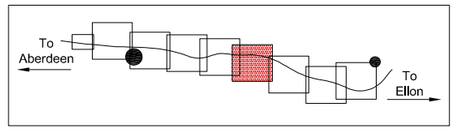
Native woodland planting around junction to reduce visibility of traffic and create a new landscape feature

Rashierieve

Cairneylaw

Southlea

Dykenook and Newtyle



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A90 Dualling - Balmedie to Tipperty

Enviromental Effects and Mitigation Measures

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NTS Figure 2

Scale 1 : 5000 at A3

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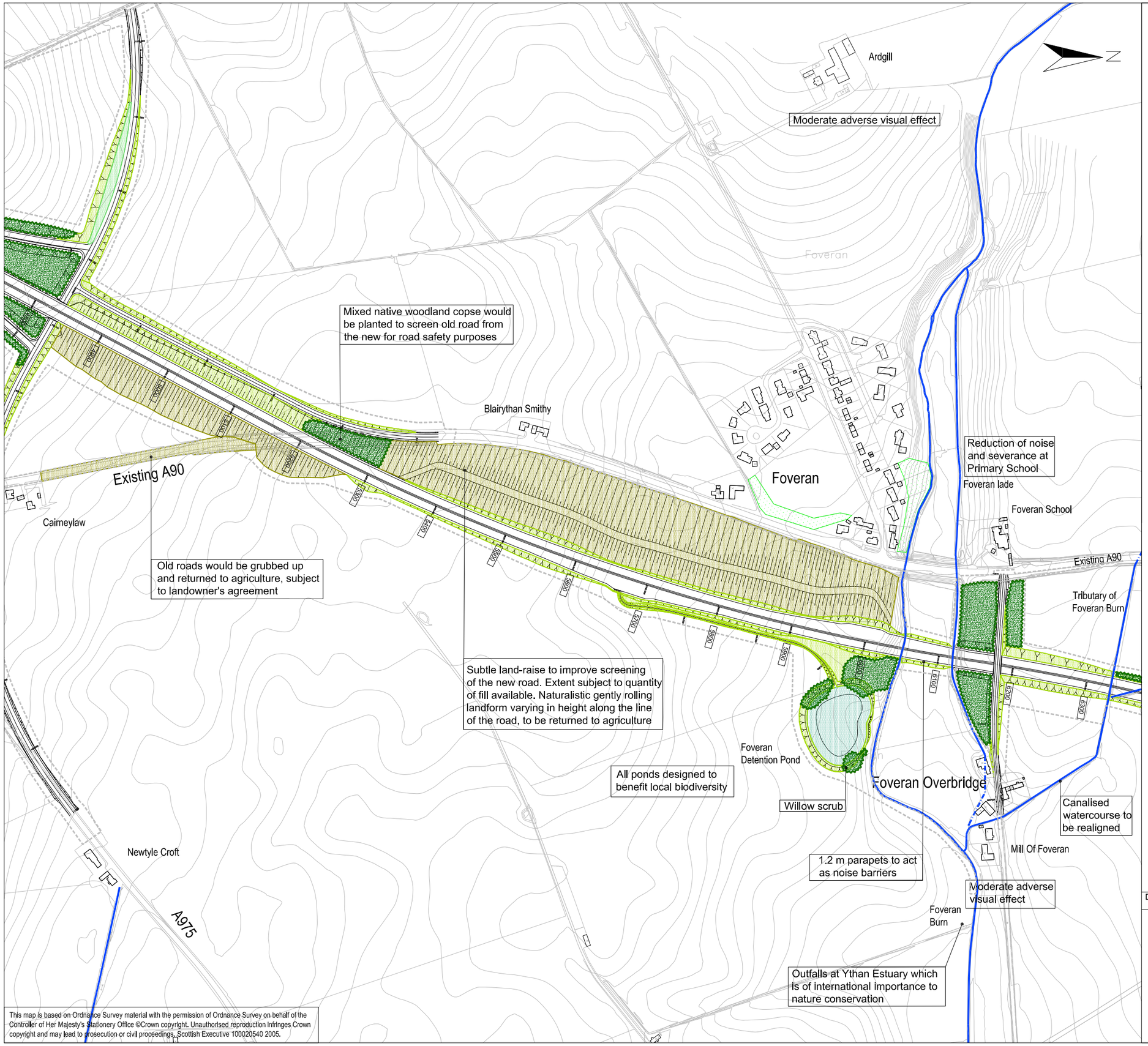

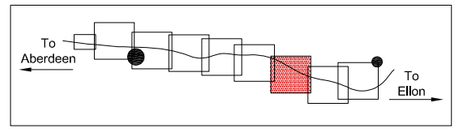

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A90 Dualling - Balmedie to Tipperty

Enviromental Effects and Mitigation Measures

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NTS Figure 2

Scale 1 : 5000 at A3

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Kincraig

West Pitmillan

Existing A90

Tributary of Foveran Burn

Oldmill

Old roads would be grubbed up and returned to agriculture, subject to landowner's agreement

Canalised watercourse to be realigned

Private water extraction potentially affected. Mitigation to be agreed with landowner

Pitmillan Overbridge

Landform of naturalistic appearance to form noise barrier and to screen the new road from the pig farm

Pitmillan

Pitmillan Detention Pond

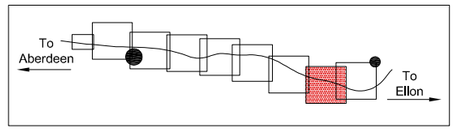
Tipperty Junction

Mitigation for potential impact at pig farm to be agreed

Unnamed Burn

B9000

Canalised watercourse



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A90 Dualling - Balmedie to Tipperty

Enviromental Effects and Mitigation Measures

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NTS Figure 2

Scale 1 : 5000 at A3

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Tipperty access to allow access to A90 and A90(T) as central reserve closed

Tipperty Industrial Estate

Central reserve gap in the A90 to be closed at Tipperty

Bus stop to be relocated

Tarty Burn

South Farden

Old roads would be grubbed up and returned to agriculture, subject to landowner's agreement

Vest Pitmillan

Native woodland planting (with glades and clearings) around junction to reduce visibility of traffic and create a new landscape feature

B9000

Tarty Detention Pond

Outfalls at Ythan Estuary which is of international importance to nature conservation

Old roads would be grubbed up and returned to agriculture, subject to landowner's agreement

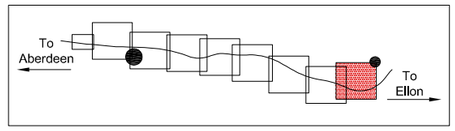
Fountainbleau

Noise barrier to reduce noise at Fornety

Low shrubs in front of the house to retain views out

Fornety

Tipperty Junction



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A90 Dualling - Balmedie to Tipperty

Enviromental Effects and Mitigation Measures
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NTS Figure 2
Scale 1 : 5000 at A3

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TABLE OF CONTENTS

1 INTRODUCTION

1.1 THE PROPOSALS

Transport Scotland[5] is proposing to improve the single carriageway section of the A90 trunk road[6] north of Aberdeen between Balmedie and Tipperty. The proposal is for an off-line dual carriageway which would link into the current dual carriageway sections to the south at Balmedie (National Grid Reference (NGR) NJ 963 167) and north at Tipperty (NGR NJ 967 267). The proposed line of the route is shown on Figure 1.1.

This Environmental Statement (ES) presents the findings of an environmental impact assessment (EIA) of the proposals (see Section 1.2). In the ES the new section of road is called the A90 (T) and the existing road the A90.

The proposals, which for the purposes of this ES have been described from south to north, include a nine kilometre (km) section of new dual carriageway, with two lanes in each direction and hard strips on each side of the road. Access would be provided via three grade separated junctions at the following locations:

- at the south side of Balmedie which would allow access on and off the A90(T) in all directions;
- at Rashierieve, which would allow access between the A975 Newburgh Road and the A90(T) to the south; and
- at Fountainbleau, which would allow access between the B9000 and the A90(T) to the north.

These would be the only locations for access on to and off the new section of road and there would be no gaps in the central reserve (apart from crossovers provided for use during maintenance activities). The proposals also include various structures to carry local roads over or under the A90(T), some local road realignments and closure of some gaps in the existing central reserve. The existing A90 between Balmedie and Tipperty would be retained and de-trunked to become part of the local road network maintained by Aberdeenshire Council. The proposals are described in more detail in Section 3.2 and shown on Figures 3.1a-e.

1.2 STATUTORY CONTEXT

1.2.1 Roads (Scotland) Act 1984 and Environmental Impact Assessment (Scotland) Regulations 1999

The proposals require EIA under the provisions of Section 20A of the Roads (Scotland) Act 1984 as amended by Part III of the Environmental Impact Assessment (Scotland) Regulations 1999. The EIA Regulations set out development for which EIA is mandatory (Schedule 1 development) and that for which EIA may be required because of the scale of development or sensitivity of the location (Schedule 2 developments).

[5] Transport Scotland is the national transport agency for Scotland. Its purpose is to help deliver the Scottish Executive's vision for transport.
[6] A trunk road is a road which falls within the responsibility of the Scottish Ministers

Construction of a new road which is of four lanes or more and 10km or more in continuous length falls into Schedule 1. The proposals for new dual carriageway appraised in this ES are less than 10km in length and therefore do not fall within Schedule 1 development. The area of the works does however exceed the threshold for Schedule 2 development which is that the area of the works exceeds 1 hectare (ha) and therefore the need for EIA has to be considered. It is considered that the proposals have potential for significant effects on the environment because of their scale and location and a formal EIA has therefore been undertaken.

This ES has been prepared in accordance with the requirements of the 1999 Regulations and the Environmental Impact Assessment (Scotland) Amendment Regulations 2002 which implement EC Directive 85/337/EEC (as amended by EC Directive 97/11EEC) on the assessment of the effects of certain public and private projects on the environment.

The ES reports the findings of the EIA (including measures that would be implemented to avoid, reduce or remedy adverse impacts) and has been prepared to inform all those with an interest in the scheme (the public, the Scottish Ministers, and organisations with statutory and non-statutory interests in the environment) of the likely effects of the proposals. The ES is being published at the same time as the draft Road Orders which are being promoted by Transport Scotland. The draft Compulsory Purchase Order (CPO)[7], which would be published at a later date, is required to allow the acquisition of land for the proposed works and for areas of essential mitigation[8].

The Regulations require that the public and certain statutory bodies must be given the opportunity to express an opinion before the project is considered by Scottish Ministers. Notification is given of publication of the ES, the venues where the ES can be inspected free of charge and the closing date for representations to Transport Scotland in the Public Notice advertising the scheme (see also Section 1.7).

1.2.2 The Conservation (Natural Habitats, &c.) Regulations 1994

Scottish Natural Heritage (SNH) has requested that information is collated as part of the EIA process to inform an appraisal of the potential effects of the proposals on the Ythan Estuary which is designated for its European nature conservation interests (see Section 10.5.3). The Habitats Regulations 1994 place a statutory duty on the competent authority (that is the authority which has powers to grant permission for the development, in this case Scottish Ministers under the Roads (Scotland) Act 1984), to meet the requirements of Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna (the Habitats Directive). Where it is considered that a plan or project could have a significant

[7] Roads Orders are published by the Scottish Ministers under the Road (Scotland) Act 1984 as the statutory development consent process for construction and operation of the trunk road. The orders show the line of the road. A compulsory purchase order (CPO) is the means whereby land can be acquired by Transport Scotland. Draft Orders are initially published and a period of consultation follows. Any objections or comments received by Transport Scotland on behalf of Scottish Ministers are taken into account in making the decision about whether the proposals should be approved and the orders made. If any objections cannot be resolved there may be a Public Local Inquiry at which the objections are examined further by a Reporter who makes a recommendation about whether the proposals should proceed. All this information is taken into account when the Scottish Ministers make their final decision about whether the scheme should proceed

[8] Essential mitigation is required to reduce the significance of identified environmental impacts. In some cases, essential mitigation (eg planting to provide a visual screen for properties) may require land beyond that needed for construction of the road, and is therefore included in the CPO

effect on a site designated for its European nature conservation interests and that the plan or project is not directly connected with the site, such sites are protected by the duties placed on competent authorities to make an Appropriate Assessment of the implications for the site in view of the site's conservation objectives and, in general terms, to agree to the plan or project only after having ascertained that it would not affect the integrity[9] of the site. Information in the ES is provided to inform the Appropriate Assessment as recommended by the Scottish Executive[10] and discussed for this project with SNH.

Table 1.1 indicates where information relevant to the Appropriate Assessment can be found in the ES. Table 10.7 summarises the effects of construction of the proposals on European sites.

Table 1.1: Location of Information in the Environmental Statement relevant to the Appropriate Assessment of the Effects of the Proposals on the Ythan Estuary SAC and SPA

Information Relevant to the Appropriate Assessment	Location of Relevant Information in the ES
Sands of Forvie SAC	
Description of the Proposals	Chapter 3
Description of the Qualifying Features of the SAC: ▪ Decalcified fixed dunes with *Empetrum nigrum* (priority feature) ▪ Embryonic shifting dunes ▪ Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) ▪ Humid dune slacks	Chapter 10
Conservation Objectives: *To ensure for the qualifying habitats that the following are maintained in the long term:* ▪ Extent of the habitat on site ▪ Distribution of the habitat within site ▪ Structure and function of the habitat ▪ Processes supporting the habitat ▪ Distribution of typical species of the habitat ▪ Viability of typical species as components of the habitat ▪ No significant disturbance of typical species of the habitat	 Chapter 10 Chapter 10 Chapter 10 Chapters 9 and 10 Chapter 10 Chapter 10 Chapter 10
Relevant Operations (i.e. those that could cause damage to the qualifying features) ▪ Civil engineering ▪ Discharges (run-off from the road)	 Chapters 3 and 10 Chapters 3, 9 and 10
Ythan Estuary, Sands of Forvie and Meikle Loch SPA	
Description of Proposals	Chapter 3
Description of the qualifying features of the SPA: The area regularly supports: ▪ Up to 1.7% of the Great Britain (GB) breeding population of little tern (Sterna albifrons) ▪ Up to 2.2% of the GB breeding population of common tern (Sterna hirundo) ▪ 4.3% of the GB breeding population of sandwich tern (Sterna sandvicensis) Over winter the area regularly supports: ▪ 6.6% of the population of pink footed goose (*Anser brachyrhynchus*) ▪ 22,817 waterfowl (an internationally important assemblage of birds)	Chapter 10
Relevant Operations (i.e. those that could cause damage/disturbance to the qualifying features) ▪ Civil engineering	 Chapters 3 and 10
▪ Discharges (run-off from road)	Chapters 3, 9 and 10

[9] The integrity of a site can be defined as the coherence of all its ecological structure, across its whole area, which enables it to sustain habitat, complex of habitats and/or populations for which it was classified

[10] Scottish Executive, Nature Conservation: Implementation of EC Directives on the Conservation of Natural Habitats and of Wild Flora and the Conservation of Wild Birds ('The Habitats and Birds Directives') Revised Guidance, June 2000

1.3 THE PROJECT TEAM

The EIA has been managed and collated by Natural Capital Ltd for and in partnership with consulting engineers Grontmij (formerly the Carl Bro Group). Grontmij has provided inputs to the geology and soils and road drainage and water environment chapters as well as the traffic and construction assumptions. Further specialist inputs have been provided by:

- Envision: visualisations;
- Grampian Badgers: badger, otter and water vole surveys;
- John Hardey: breeding bird survey;
- Kirkdale Archaeology: archaeology and cultural heritage;
- PPCA Ltd: landscape and visual appraisal;
- Scottish Agricultural College (SAC): agriculture;
- Toni Watt: bat surveys; and
- WSP Environmental: air quality and noise.

1.4 BACKGROUND TO THE SCHEME

Early studies were undertaken by JMP Consultants for the then Scottish Office in the 1980s into the potential to upgrade the existing road to dual carriageway standard.

In June 1994 Carl Bro was commissioned by the then Scottish Office to undertake a Stage 2 Route Options Assessment. The study options included an evaluation of the original JMP route together with off-line alternatives that were examined for their engineering and environmental merits. Carl Bro went on to prepare draft Orders which were published in draft in 1996 together with a Stage 3 environmental assessment that was produced by their sub-consultants, Turnbull Jeffrey Partnership. Further to the publication of the draft Orders, objections were received from affected landowners and tenants. These related to intrusion in the countryside, noise, visual impact, loss of and severance to land and increased journey times for those requiring local access.

Following the moratorium on preparation of all major trunk road schemes in 1997, the scheme was considered as part of the 1999 Strategic Roads Review 'Travel Choices for Scotland' (see Section 5.3). In November 1999 the Scottish Executive published the results of the review which included the decision that the A90 Balmedie to Tipperty scheme was to be held in abeyance and considered alongside other emerging priorities for a future trunk road programme which would be appraised using a multi-modal approach.

In 2004 Carl Bro produced a Scottish Transport Appraisal Guidance (STAG) report that assessed transport problems associated with the users of the A90 corridor between Balmedie and Tipperty and appraised options for transport improvements to address current and emerging transport problems. Environmental input to the STAG appraisal was made by Natural Capital. The appraisal was objective led and a key finding was that platoons of traffic regularly form along the section behind slow moving vehicles.

In June 2005, following consideration of the STAG report, the then Minister for Transport announced that the offline dual carriageway option with grade separated junctions should be progressed to design stage.

Following the Minister's decision a re-start workshop[11] was organised between representatives of the Scottish Executive and the Grontmij design team which included Natural Capital. The purpose of the workshop was to bring together the key parties and to jointly review the previous scheme objectives (see also Section 2.3) and preferred scheme (including junction arrangements) in line with current design standards, environmental constraints and legislation, together with comments received following the publication of the previous draft Orders. The workshop attendees identified that several 'route sub-options' should be developed and further investigated.

These sub-options were appraised by the project team and consulted on at a public exhibition in June 2006 and the findings reported in the Stage 2 Addendum Report[12]. A preferred scheme, Sub-option 5, different from that originally published in the 1996 draft Orders (Sub-option 1), was identified for taking forward, and it is this sub-option which is appraised in detail in this ES (see also Section 2.4).

1.5 THE SCHEME

The proposed scheme would connect with the existing dual carriageway at the north side of Balmedie with a new southern junction constructed at the south of the village (see Sections 1.1, 2.4-2.5 and 3.2.1). The village, which is expanding, is situated mainly to the east of the A90 close to the coast which has an extensive dune system. The west side of the road is mainly rolling agricultural land with scattered properties, farms and small areas of woodland.

The new road would be aligned to the west of the A90 leaving the existing road north of Drumhead Lodge and Blairton at the north of Balmedie (see Figure 3.1b) and passing west of the Cock and Bull public house travelling gently uphill on areas of embankment past South Orrock and Orrock House mainly through pasture fields. The route then passes north in cutting though a more intimate area of landscape with smaller fields near Boghead and Hill of Menie cutting through an area of young forestry planting between Stoneyards and Dambrae.

The landscape becomes open and more expansive near Aikenshill where the road would cross large, mainly arable fields with few hedgerows before dropping down off the elevated land back to the coastal plain with a new junction to the west of the Newburgh Road. Just south of Cairneylaw (a derelict property) the existing A90 would be realigned to the Newburgh Junction. The new road would then cross over the existing A90 at grade before passing to the east of the village of Foveran and crossing the valley of the Foveran Burn west of the Mill of Foveran. The road would then cut across fields west of Pitmillan Farm (see Photograph 21, Annex D) to a junction immediately south of Fountainbleau Farm and tie in to the existing dual carriageway at the village of Tipperty.

Further information on the scheme is included in Section 3.2. Photographs of the area of the proposals are collated in Annex D. The photographs are presented from south to north along the scheme.

[11] Further details of the workshop are contained in Report of Workshop, October 2005, Capital Value and Risk Ltd

[12] Transport Scotland, 2006. A90 Balmedie to Tipperty, Stage 2 Addendum Report. Carl Bro and Natural Capital. November 2006

1.6 APPROACH TO THE ASSESSMENT

1.6.1 Objectives of the Environmental Statement (ES)

The objectives of the ES can be summarised as follows:

- to identify the potential environmental impacts from construction and operation of the proposals, taking into account the characteristics of the development, the sensitivities of the local environment and the concerns of interested parties;

- to identify and describe measures which will be taken to mitigate identified adverse environmental impacts and deliver environmental benefits;

- to predict and evaluate the extent and significance of residual effects taking into account the agreed mitigation; and also

- to provide information to inform the Appropriate Assessment of potential effects on the Ythan Estuary.

1.6.2 Sources of Information

The following sources of information have informed the ES:

- technical information, plans and drawings from within the project team;
- published information including relevant planning documents;
- statutory organisations and other relevant bodies and individuals consulted on the proposals;
- unpublished information made available by consultees;
- relevant Ordnance Survey (OS) maps; and
- site survey work.

Other specific technical information, guidance sources and reports which have been used for the EIA are referenced in the appropriate sections of the ES.

1.6.3 Consultations

In accordance with good practice in EIA, individuals and organisations whose interests might be affected by the proposed developments have been consulted for their views and to obtain any relevant information during the course of preparing the Stage 2 Addendum and this ES. These consultations have helped to identify key issues, opportunities and constraints and helped to define the scope of the EIA.

A list of organisations and individuals who were consulted and a summary of, and comment on, their responses are provided in Annex A together with an indication of how that information and comments have been used in the EIA and in collating the ES.

In June 2006 a public exhibition was held over two days in Balmedie at the White Horse Inn which presented the options that were under consideration and sought public feedback and comment (see Section 2.4.4).

If the project progresses to construction, consultation and discussions would continue with all key parties to ensure commitments are delivered appropriately.

1.6.4 Approach to the Assessment

This Environmental Statement (ES) has been prepared to meet the requirements of the EIA Regulations and broadly following guidance in the Design Manual for Roads and Bridges (DMRB) Volume 11. The DMRB recommends a three-stage approach to EIA:

- Stage 1- scoping of the environmental constraints;
- Stage 2- consideration of broad corridor options and identification of a preferred corridor; and
- Stage 3- identification of a preferred alignment and assessment of the preferred scheme.

The EIA has made best use of information gathered in the different stages for the early progression of the scheme and updated the information as required. The approach has also been informed by other Scottish Executive and EIA guidance[13,14]. Tables 1.2 and 1.3 summarise where the information required by the EIA Regulations can be found in the ES and Table 1.1 identifies where in the ES the relevant information can be found to inform the Appropriate Assessment as required by the Habitats Regulations. The individual technical assessments have been carried out with reference to relevant legislative and policy requirements and current best practice. The focus and scope of the EIA was informed by the comments from consultees (see Section 1.6.3).

In the EIA a common approach has been used for the assessment of each environmental topic. This has included:

- establishing the baseline conditions through a combination of desk review, consultations and site surveys taking account of any committed development projects which could change the baseline in the future;
- identifying potential environmental impacts15 which could result from development of the proposals;
- identification of mitigation measures to prevent, reduce and, where possible offset any impacts which could either by themselves, or in combination with other impacts have a significant adverse effect; and
- assessment of the level of significance of all residual effects (direct and indirect, adverse and beneficial, short-term and long-term, permanent and temporary) taking account of committed mitigation measures.

Potential impacts have been taken into account in the iterative development of the proposals. Where the potential for a significant adverse effect has been identified resulting from an impact either by itself or in combination with other impacts, the environmental team has fed back concerns to the design team who have taken account of the issues in refining the design for the scheme and the construction methodology.

[13] Scottish Development Department Planning Advice Note Pan 58 Environmental Impact Assessment (1999)
[14] IEMA Guidelines for Environmental Impact Assessment (2004)
[15] Impact is specific and applies to a particular element of the environment (ie air, water). In order to assess the impact of a proposed development on a particular aspect of the environment, it is firstly necessary to measure the degree of change caused to that element by the proposal. A description of the change to an element of the environment caused by a proposed development can be made factually. Effect is a broader based view of the effect of the cumulative consequences of one or more impacts on a specific aspect of the environment (often referred to as the receptor). Assessment of effect involves not only a degree of professional judgement but also some extrapolation and generalisation, both of which also involve judgement (IEMA, 2004)

All mitigation measures have been discussed with Transport Scotland and have only been taken into account in assessments after commitment has been given to their delivery. A collated list of mitigation measures is included in Annex B.

Permanent effects have been considered associated with permanent development and use of land for the project such as visual changes or loss of habitat. Short-term effects from construction are evaluated and long-term effects from use of the dual carriageway are considered.

The EIA Regulations require significant effects to be described (see Schedule 4). Significance is not defined in the Regulations. The definition of a significant effect, which has been adopted in this assessment, is one which the project team considers, in isolation or in combination with others, is material[16] to the environment and should be taken into account in the decision-making process.

The significance of an effect results from the interaction between its magnitude (which is related to the extent of the physical change, its special extent, duration and frequency) and the value of the resource or the number and sensitivity of those people who might be affected.

The process of assessing significance includes:

- selecting criteria (for each discipline) from recognised sources (including legal standards, policy and best practice guidance and accepted practice) against which effects have been assessed (assessment criteria);
- establishing significance thresholds drawing on the above sources, consultations and experience etc17;
- comparing the predicted impacts with the significance thresholds and defining the nature of residual effect.

In this ES, where relevant[18], effects have been categorised into:

- none: no detectable change to the environment;
- minor: a detectable but non-material change to the environment;
- moderate: a material but non-fundamental change to the environment;
- major: a fundamental change to the environment.

A summary of the effects of the scheme proposals is included in the Environmental Impact Tables presented in Annex C.

Effects categorised as being moderate or major (adverse or beneficial) are considered in this ES to be significant. Cumulative effects are also considered in terms of the overall importance for a wider area of effects of a similar nature occurring at different locations or in terms of overall importance of effects of a different nature occurring at the same location. In addition the potential for

[16] i.e. important or having an important effect and of sufficient importance to take into account in development decisions

[17] For some environmental aspects such as noise or air quality it is possible to use measurable, quantifiable criteria from legislation or guidance to establish at what level an effect becomes significant. For other areas this may not be possible and it may be necessary to rely on more qualitative criteria and this necessarily involves the use of professional judgement. Choosing the relevant criteria also depends in part on the particular characteristics of the project which is being assessed

[18] In Chapter 17 (Vehicle Travellers) appraisal criteria follow the DMRB categories for ability to view the surrounding landscape and for level of driver stress

effects from this project to occur at the same time as those from another development which has been approved has also been considered.

1.6.5 Limitations of the EIA

Any limitations to the EIA are summarised in each technical chapter, where relevant, together with the means proposed to mitigate these.

The EIA has been based on assumptions about an outline design for the scheme (see Section 3.2). Where details of the project have still to be finalised (such as detailed construction methods etc) assumptions have been made in the ES to allow potential impacts to be considered and appropriate mitigation to be identified. If as the detailed proposals are developed, any significant effects are identified which are considered greater than those reported in this ES, an addendum to the ES would be published for public consultation and comment and further consideration by Transport Scotland.

1.7 REVIEW AND COMMENTS

The Environmental Statement and copies of the draft Orders can be viewed during normal working hours at:

- Transport Scotland
  Trunk Roads: Infrastructure and Professional Services
  Buchanan House
  58 Port Dundas Road
  Glasgow
  G4 OHF

- Aberdeenshire Council Offices
  Woodhill House
  Westburn Road
  Aberdeen
  AB16 5GB

- Balmedie Library
  Eigie Road
  Balmedie
  Aberdeenshire
  AB23 8YF

The ES can also be viewed on Transport Scotland website: www.transportscotland.org.uk

The ES comprises the main text and also a Non-Technical Summary (NTS) which is bound into the front of the main text and is also available as a free-standing document.

Copies of the ES are available in hard copy for £150 or on CD for £10 (both including postage and packing). VAT is chargeable on CDs. The NTS (which is available free of charge) and the main ES are available from the Director of Trunk Roads Infrastructure and Professional Services (address as above) at Transport Scotland.

Comments on the proposals or their environmental effects can be sent in writing to the Director of Trunk Roads Infrastructure and Professional Services at Transport Scotland within six weeks of the date of publication of the notice for the Environmental Statement.

1.8 SCOPE AND STRUCTURE OF THE ES

This document is the main text of the ES. The remainder of this report is structured as follows:

- Chapter 2 explains the need for the project, its objectives and the alternatives which have been considered;
- Chapter 3 describes the project proposals and the assumed construction and maintenance activities;
- Chapter 4 the traffic appraisal work that has been undertaken and key findings;
- Chapter 5 sets out the policy and planning framework for the proposals.

The remaining chapters set out the appraisals of the environmental effects of the proposals as follows:

- Chapter 6: Land Use and Property
- Chapter 7: Agriculture
- Chapter 8: Geology and Soils
- Chapter 9: Road Drainage and the Water Environment
- Chapter 10: Ecology and Nature Conservation
- Chapter 11: Landscape and Visual Effects
- Chapter 12: Archaeology and Cultural Heritage
- Chapter 13: Disruption due to Construction
- Chapter 14: Noise and Vibration
- Chapter 15: Air Quality
- Chapter 16: Pedestrians, Cyclists, Equestrians and Community Effects
- Chapter 17: Vehicle Travellers
- Chapter 18: Summary of Significant Effects

Figures for all chapters are included in Volume 2: A90 Dualling, Balmedie to Tipperty, Environmental Statement: Figures.

Supporting information is provided in the following annexes:

- Annex A: Consultation Responses
- Annex B: Collated Mitigation Measures
- Annex C: Environmental Impact Tables
- Annex D: Gazetteer of Photographs (photographs of key locations along the scheme mentioned in the text numbered from south to north)

Table 1.2: Matters for Inclusion in Environmental Statements as required by Schedule 4, Part I of The Environmental Impact Assessment (Scotland) Regulations 1999

Requirement	Location of Information in the ES
Part I	
1 Description of the development, including in particular:	
(a) a description of the physical characteristics of the whole development and the land-use requirements during the construction and operational phases;	*Chapter 3 (Section 3.2) and Sections 6.7.1 and 7.6.1*
(b) a description of the main characteristics of the production process, for instance, nature and quantity of the materials used;	*Section 3.3 describes construction*
(c) an estimate by type and quantity, of expected residues and emissions (water, air, and soil pollution, noise, vibration, light, heat, radiation *etc*) resulting from the operation of the proposed development.	*Chapters 9; 15; 8; and 14 in Assessment of Residual Effects (Operational)*
2 An outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for his choice, taking into account the environmental effects.	*Chapter 2 (Section 2.4)*
3 A description of the aspects of the environment likely to be significantly affected by the development, including, in particular:	*Chapters 6 to 17*
• population	*Chapters 6, 11, 13, 14, 15, 16 and 17 (Sections 6.7, 11.9, 13.9, 14.9, 15.9, 16.8 and 17.8)*
• fauna and flora	*Chapters 9 and 10 (Sections 9.5, 9.9, 10.5 and 10.10)*
• soil	*Chapter 8, (Sections 8.4 and 8.8)*
• water	*Chapters 9 (Sections 9.5 and 9.9)*
• air and climatic factors	*Chapter 15 (Sections 15.5 and 15.9)*
• material assets, including the architectural and archaeological heritage	*Chapters 6 and 12 (Sections 6.4,6.7, 12.4 and 12.8)*
• landscape	*Chapter 11 (Sections 11.4 and 11.8)*
• the inter-relationship between the above factors	*Chapters 6 to 18*
4 A description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary or cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development resulting from:	*Chapters 6 to 18*

Requirement	Location of Information in the ES
(a) the existence of the development;	*Chapters 3 - 18*
(b) the use of natural resources;	*Chapters 6-11*
(c) the emission of pollutants, the creation of nuisances and the elimination of waste;	*Chapters 3, 8, 9, 14 and 15 (Sections 3.9 , 8.8, 9.9,14.9 and 15.9*
and the description by the applicant or appellant of the forecasting methods used to assess the effects on the environment.	*Chapters 1 and 6-17 (Sections 1.6, 6.5, 7.5,8.5,9.6,10.7,11.5,12.8,13.9,14.6 15.6,16.5 and 17.5*
5 A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.	*Collated mitigation in Annex B (taken From Chapters 3 and 6-17)*
6 A non-technical summary of the information provided under *Paragraphs 1 –5* of this Part.	*Non-Technical Summary*
7 An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the applicant or appellant in compiling the required information.	*Chapter 1, (Section 1.65) and in relevant sections of technical chapters*

Table 1.3: Matters for Inclusion in Environmental Statements as required by Schedule 4, Part II of The Environmental Impact Assessment (Scotland) Regulations 1999

Requirement	Location of Information in the ES
Part II	
1 A description of the development comprising information on the site, design and size of the development.	*Chapter 3*
2 A description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse impacts.	*Collated mitigation in Annex B (taken From Chapters 3 and 6-17)*
3 The data required to identify and assess the main effects that the development is likely to have on the environment.	*Chapters 4-17, (Sections 4.2, 5.3-5, 6.4, 7.4, 8.4, 9.5, 10.5, 11.4, 12.4, 13.4, 14.5, 15.5, 16.4, 17.4*
4 The main alternatives studied by the applicant and an indication of the main reasons for his choice, taking into account the environmental effects.	*Chapter, (Section 2.4)*
5 A non-technical summary of the information provided under *Paragraphs 1 –4* of this Part.	*Non-Technical Summary*

2 SCHEME NEED, OBJECTIVES AND ALTERNATIVES

2.1 INTRODUCTION

This chapter explains the need for a dual carriageway between Balmedie and Tipperty and describes the sub-options considered in the selection of the final preferred route for the off-line dual carriageway.

2.2 NEED

The STAG appraisal[19] published in 2004 (see Section 1.4) undertook an analysis of existing and emerging problems presented to users of the existing transport network in the area. The existing single carriageway section of the A90 has an annual average daily traffic flow of 20,000 vehicles per day and is not capable of providing efficient access to and from the north of Aberdeen, particularly at peak periods. Journey time unreliability occurs due to incidents and accidents impacting on general operating conditions. The road in its current layout has many side road junctions and accesses with local traffic joining the trunk road having an impact on through-traffic operation. Given the current traffic growth trends, this problem is likely to grow in the future, resulting in a level of service that would further decline as traffic volumes increase. This would affect all users, including cars, freight and bus services (including those linking to the Ellon park-and-ride site).

Scottish Ministers used the findings in the STAG report in their determination, and announced in June 2005 that an off-line dual carriageway with grade separated junctions should be taken forward to alleviate the current and emerging problems in the corridor.

2.3 SCHEME OBJECTIVES

The scheme objectives, defined at a workshop held in 2005[20], are:

- to improve strategic and local accessibility on the A90 route corridor between Balmedie and Tipperty for all types of road users;
- to improve the movement of traffic on the A90 between Balmedie and Tipperty in order to aid economic prosperity and development in the north east of Scotland;
- to improve road safety on the A90 between Balmedie and Tipperty;
- to minimise intrusion of the new works on the natural environment, cultural heritage and people and to enhance the local environment where opportunities arise; and
- to facilitate integration along the A90 corridor by providing opportunities for more reliable public transport.

Section 2.4.6 demonstrates how the scheme which is assessed in this ES meets the objectives.

[19] Scottish Executive, Enterprise, Transport and Lifelong Learning Department, 2004. A90 Balmedie – Tipperty Corridor Study STAG Report. Carl Bro and Natural Capital

[20] Scottish Executive, Enterprise, Transport and Lifelong Learning Department, 2005. A90 Balmedie to Tipperty. Project Restart Workshop Report

2.4 SCHEME ALTERNATIVES

2.4.1 Introduction

Section 1.4 provides an overview of the development of the preferred scheme with Table 2.1 providing a summary of the options considered at each stage. Section 2.4.2 describes the route sub-options appraisal undertaken over the recent period in the development of the current preferred scheme.

Table 2.1: Scheme Options 1980s-2004

Period	Description	Summary of Conclusions
1980s	On-line upgrade to dual carriageway	Not taken forward as did not achieve design standards
1994 –1996[21]	Stage 2 route options: • orange (75% on-line) • red/blue (off-line to the east) • red/green (off-line to the east; more on-line north of Foveran)	Red/green route taken forward to draft Orders in 1996 as considered best met requirements at that time
2004	STAG appraisal examined: a. enhanced bus services b. rail services to Peterhead c. wide single carriageway standard d. dual carriageway standard	Appraisal concluded: a. failed to meet objectives b. failed to meet objectives c. achieved objectives d. achieved objectives - Scottish Ministers decided to take forward dual carriageway design

2.4.2 Route Sub-Options

In 2005 the previously published route was reviewed and further sub-options identified that had the potential to meet the scheme objectives. These sub-options take into account changes since 1995 in design standards, environmental constraints and legislation together with comments received following the publication of draft Orders in 1996.

The following sub-options were developed in more detail and taken to public consultation in 2006 (see Section 2.4.4). Figure 2.1 shows the routes of the four sub-options.

2.4.2.1 Sub-Option 1

Sub-option 1 was based upon the preferred option from 1996. The route diverted west from the existing A90 at the termination of the existing dualled section and passed between the Cock and Bull Public House and South Orrock before sweeping around the east side of the hillock near Orrock House. It then crossed to the east of the existing A90 at Delfrigs and remained east of and generally parallel to the existing road past Foveran before re-joining the existing road at Fountainbleau. This route was discounted during the recent Stage 2 assessment as it created a significant intrusion at Delfrigs, with only limited room available to

[21] The Scottish Office Development Department, 1995. A92: Balmedie to Tipperty, Stage 2 Environmental Assessment Report. Carl Bro Group and Turnbull Jeffrey Partnership
The Scottish Office Development Department, 1996. A90 Balmedie to Tipperty, Stage 3 Environmental Assessment, Volume One: The Proposed Scheme. Carl Bro Group and Turnbull Jeffrey
The Scottish Office Development Department, 1996. A90 Balmedie to Tipperty, Stage 3 Environmental Assessment, Volume Two: Detailed Environmental Statement. Carl Bro Group and Turnbull Jeffrey

mitigate potential, noise, air quality or landscape impacts due to the number of properties in close proximity to the line.

2.4.2.2 Sub-Option 2

Sub-option 2 would also have begun towards the north edge of Balmedie as Sub-option 1 and then veered westwards enabling the existing road to be linked directly into Balmedie. The proposed route would have continued northward passing round the east side of the hillock at Orrock House before crossing below the existing road between Pettens and Hill of Menie. At this crossing point the existing road would have been maintained by means of an overbridge. The route would have continued northward running almost parallel to the existing road, past Menie, Newtyle and Foveran before rejoining the existing road corridor at Fountainbleau. The construction of this route would have involved severing Menie House, a regionally important B listed building, from its Gate Lodge, which, as part of the curtilage of Menie House is also considered B listed. Aberdeenshire Council indicated in a consultation meeting that it would prefer for this not to happen.

2.4.2.3 Sub-Option 3

Sub-option 3 differed slightly from Sub-options 1 and 2 by providing an online solution at the south end of the scheme. This route would have followed the line of the existing road northwards incorporating dualling of the existing single carriageway. The route then continued online until its natural break from the existing alignment at Pettens. From this point the route would have continued northward parallel to the existing road following the same route as Sub-options 1 and 2.

As the existing single carriageway would have been replaced by the dual carriageway at the south of the scheme access would have been severed at a number of locations. Sub-option 3 would have had the least impact on the A listed Orrock House however, like Sub-option 2 it also severed Menie House from its Gate Lodge and because it was online to begin with would have required the provision of a significant number of parallel roads linking the dispersed properties and integration of those with the existing A90.

2.4.2.4 Sub-Option 4

This sub-option was not taken forward for detailed evaluation in Stage 2 since it represented only a minor shift in the alignment at the junction with the B9000 at Tipperty. It was considered that the alignment of the northern section of the route would be optimised for all options as part of the development of the preferred option.

2.4.2.5 Sub-Option 5

Sub-option 5 (on which the now preferred option is based) started as Sub-option 1 at the north edge of Balmedie. The route passed on the west side of the Cock and Bull and then to the east of the hillock at Orrock House. The route would then veer westwards round the back of the Hill of Menie and continue to curve round the west side of Dambrae and Aikenshill. It would head eastwards before crossing the existing A90 just south of Foveran and then progress northwards parallel to the existing road as the other sub-options. Like Sub-option 1, this sub-option would not sever Menie House from its Gate Lodge however unlike Sub-option 1 it would avoid significant intrusion at Delfrigs.

Sub-option 5 would have the lowest number of properties within 200m of the road of all sub-options and so was considered to have the least potential for impact on air quality and noise and vibration. Sub-option 5 would impact upon the A listed Orrock House, however no more than the original 1996 route[22] and overall would impact upon the least number of archaeological sites. The estimated construction cost for this sub-option was also found to be lower than the other sub-options.

An option to the west of the existing A90 was briefly considered in work undertaken in the 1990s. It was not taken forward at that stage because of its potential landscape impact. It was re-looked at in recent work because of the potential benefits to people and because it was considered that with careful engineering the landscape impacts could be reduced.

2.4.3 Junctions

The junction strategy, involving access to the new dual carriageway at Balmedie at the A975 route at Rashierieve (Newburgh Road Junction) and the B9000 at Tipperty was also re-examined using the up-to-date main traffic patterns in the study area. The resulting junction strategy is common to all of the route sub-options considered with the selection process described below.

2.4.3.1 Balmedie

The community of Balmedie is currently expanding with further land being allocated for development in the Local Plan (see Section 5.5). The significant traffic movements generated by the community result in approximately 70% of the traffic using the southern access junction to head southwards to Aberdeen. The B977 to the west of Balmedie currently provides an alternative route to the congested A90/Anderson Drive leading to Dyce and Aberdeen Airport. The B977 and the northern access to Balmedie form a staggered junction to the existing A90.

In the junction strategy process various scenarios for grade separated junctions at Balmedie were considered:

- full junction to the south of Balmedie;
- full junction to the north of Balmedie;
- half junction to the south of Balmedie and half junction to the north of Balmedie;
- full junction to the south of Balmedie and half junction to the north of Balmedie; and
- full junction to the south of Balmedie and full junction to the north of Balmedie.

For each of the scenarios an outline layout was prepared, traffic flows generated and a comparative cost benefit analysis undertaken. This process indicated that a full junction to the south would be the most effective solution.

[22] In fact when the preferred junction strategy is taken into account the option would have less effect on the setting of Orrock House as the junction is located to the south of Balmedie whereas in the 1996 scheme it was sited to the north

2.4.3.2 Newburgh Road/Tipperty

The A975 provides the main link between Aberdeen City and the coastal settlements of Newburgh and Cruden Bay. The A975 links with the existing A90 near Rashierieve, midway between Balmedie and Tipperty.

The B9000 runs east-west between Newburgh and Pitmedden and crosses the A90 to the south of Tipperty. A grade separated junction at this location would cater for both existing turning traffic and also traffic from Tipperty.

In the junction strategy process various scenarios for grade separated junctions were considered:

- half junction at the A975 and full junction at Tipperty;
- half junction at the A975 and half junction at Tipperty; and
- no junction at the A975 and full junction at Tipperty.

For each of the scenarios an outline layout was prepared, traffic flows generated and a comparative cost benefit analysis undertaken. This process indicated that a half junction at the A975 and a half junction at Tipperty would be the most effective solution.

2.4.4 Public Exhibitions

A public exhibition was held in Balmedie in June 2006 to seek public views on the sub-options. The key findings from the exhibition are reported in an exhibition report [23]. The feedback given at the exhibition led to the refinement of several aspects of each sub-option as follows:

- on Sub-options 1, 2 and 5 realignment of the existing A90 in the Balmedie north area;
- on all sub-options relocation of A975 Newburgh Road Junction to the north thus reducing potential impacts on properties Aikenshill and Kirkhill;
- Sub-options 1, 2 and 3 moved slightly east at the A975 thus reducing potential impacts on properties Newtyle House and Southlea;
- relocation of the overbridges at Orrock House and Boghead (Sub-options 1, 2 and 5); and
- B9000 passes below the proposed mainline at Tipperty.

From questionnaire responses the public's opinion on preferred route choice was gauged. In summary these findings were:

- the majority of interest in the scheme was from the local community with 78% of comments received for people within 1km of the route sub-options;
- from all the responses received the most favoured scheme was Sub-option 5, chosen by 42 of the respondents and Sub-option 1 being the least favoured chosen by 10;
- an analysis of local interests found that Sub-option 5 was the most favoured sub-option (34% of those who responded) and with Sub-option 1 the least favoured (only chosen by 6%);
- regional interest showed Sub-option 3 to be the most favoured option, although all sub-options scored closely;

[23] Transport Scotland, 2006. Route Options Public Exhibition Report. Carl Bro, August, 2006

- residents on the east of the existing A90 favouring Sub-option 5;
- residents to the west of the existing A90 were more split in their preferences with Sub-option 2 being favoured, closely followed by Sub-option 3;
- support from interest groups on both sides of the existing route saw greater support against an easterly route over the support against a westerly route.

In summary from the analysis undertaken it was seen that the overall respondents' preference was for Sub-option 5. From local interest the highest support was for Sub-option 5 which was then closely followed by Sub-option 3. Sub-option 1 was recognised as the least preferred sub-option.

2.4.5 Recommendation

The engineering, environmental and economic appraisals all concluded that the same sub-option (Sub-option 5) should be taken forward as the preferred route. All of the sub-options performed well in the various appraisals and there were generally only small differences between them.

Sub-option 5 was therefore taken forward to DMRB Stage 3 for development as the preferred route. This recommendation differs from that in the original Stage 2 Report[24], which selected the line of Sub-option 1 as the preferred route. The justification for this change in recommendation is summarised below:

- Sub-option 5 avoids significant intrusion at Delfrigs and adjacent properties. The differences between sub-options for landscape and visual intrusion are generally small but Sub-option 5 provides more room for mitigation earthworks and planting.
- Sub-option 5 has fewest properties in close proximity to the new road which would decrease the potential for significant noise and vibration and air quality effects.
- Sub-option 5 has potential to affect fewer archaeological sites than other sub-options. Its impact on Orrock House is less than the 1996 route and it would not impact on the Menie Estate.
- Sub-option 5 has slightly less potential for community severance effects than other sub-options.
- Sub-option 5 has the least challenging construction constraints.
- Sub-option 5 is cheaper than the other sub-options, mainly due to an earthworks balance between cut and fill material.
- Sub-option 5 has the best benefit-cost ratio, however it is very similar to the other sub-options.

2.4.6 Meeting the Scheme Objectives

All sub-options would have met the scheme objectives. It was considered that the proposed scheme, based on Sub-option 5, would best meet the objectives, as described in Section 2.4.5. Table 2.2 summarises how Sub-option 5 meets the scheme objectives.

[24] The Scottish Office Development Department, 1995. A92: Balmedie to Tipperty, Stage 2 Environmental Assessment Report. Carl Bro Group and Turnbull Jeffrey Partnership

Table 2.2: Preferred Scheme Performance relative to Scheme Objectives

OBJECTIVE	PERFORMANCE
To improve strategic and local accessibility on the A90 route corridor between Balmedie and Tipperty for all types of road users	The new road would benefit strategic traffic by providing a dual carriageway with good overtaking opportunities and by removing access to the road for local traffic apart from at junctions. Local users can travel using existing roads that would be retained but would carry significantly less traffic volume
To improve the movement of traffic on the A90 between Balmedie and Tipperty in order to aid economic prosperity and development in the north east of Scotland	New dual carriageway is effective in carrying longer distance movements
To improve road safety on the A90 between Balmedie and Tipperty	A modern dual carriageway would have significantly better levels of road safety than the existing route
To minimise intrusion of the new works on the natural environment, cultural heritage and people and to enhance the local environment where opportunities arise	The scheme has been chosen as the sub-option with least potential for environmental effects and has been designed with environmental mitigation considered throughout, resulting in a layout that minimises significant adverse environmental effects and seeks to provide opportunities for environmental enhancements
To facilitate integration along the A90 corridor by providing opportunities for more reliable public transport	Public transport services would be more reliable in terms of journey time

2.4.7 Scheme Refinements

As part of Stage 3 refinements the route of Sub-option 5 was re-evaluated near Orrock House following site visits by the team. In the original draft Orders the scheme passed to the west of a hillock near the house (see Section 1.4). In the more recent sub-option work a route was investigated on the east side of the hill. Detailed work on-site indicated that this route did not fit as comfortably in the landscape and would require more earthworks than as first thought. There is a ridge running east from Orrock House with a distinctive knoll at the end (the hillock), and this is a noticeable landscape feature for northbound travellers between Balmedie and the Cock and Bull. It was considered that realigning the road so that it ran through the slight dip in the ridge west of the knoll (almost exactly following the original draft Orders alignment) would give a small but distinct improvement in the landscape fit and thus a slight reduction in the landscape impact of this section of road. The line to the west was therefore further investigated and compared with the line to the east in terms of other potential environmental impacts.

An appraisal of the effects on setting of the listed building indicated that both lines would significantly affect the setting and choice of the line to the east did not reduce the impact to non-significant. Initial noise work indicated that the Cock and Bull and the two properties were more affected by both lines than Orrock House. When further predictive noise modelling was undertaken, it was identified that there would be a major adverse noise impact on Orrock House and consideration was given to returning to the original consultation alignment. However, it was identified that this could result in major adverse noise

impacts at rear of the Cock and Bull Public house and adjacent cottages. The proposed alignment was considered to 'split the difference' between the receptors in terms of noise impacts. It was decide on balance that the west line had less impact than the eastern line and the line to the west was therefore taken forward.

As part of the outline design work options which would avoid intrusion to the gardens of properties at South Folds and at Number 6 The Holdings were sought. These options would have required departures from standards and the options were not accepted by Transport Scotland because of safety concerns.

As the scheme was progressed to its final stages for this EIA and for draft Orders, further safety and standard checks by Transport Scotland indicated the need to close openings in the existing central reserve south of Balmedie and to provide alternative accesses on to the A90 for properties near the road. This has led to the inclusion of side road proposals south of Balmedie (described in Section 3.2.2) as compared with those seen at the public exhibition and by consultees to accommodate the required changes.

3 THE PROJECT PROPOSALS

3.1 INTRODUCTION

This chapter describes the physical works which would be required for the proposals including the new road infrastructure, the associated structures and other features. The chapter also outlines the construction activities which have been assumed for the purposes of this environmental assessment.

Reference is made to mitigation measures which have been developed as an integral part of the design process, with specialists working together to make balanced decisions. Mitigation measures relating to each environmental topic are included in each relevant chapter and a collated list of committed mitigation is included in Annex B.

3.2 DETAILS OF THE SCHEME

3.2.1 Overview

A general description of the proposals is included in Sections 1.1 and 1.5. Key elements of the proposals include:

- the dual carriageway;
- junctions and ancillary works;
- structures including bridges and culverts;
- side road realignments;
- embankments and cuttings;
- safety fences;
- drainage; and
- signing and lighting.

The geographical context for the scheme is shown in Figure 1.1 and the scheme shown in more detail in the route window maps presented in Figures 3.1a-e. A typical cross section of the road is shown in Figure 3.2.

It has been assumed for design and assessment purposes that the road would be open in 2010 and that its design year (15 years after opening and used for design calculations) is 2025 with traffic forecasts estimated up to this year[25].

The new off-line dual carriageway begins at the north edge of Balmedie and passes on the west side of the Cock and Bull Public House and the hillock at Orrock House (see Photograph 10). The route then turns westwards to the west of the Hill of Menie. The route continues to curve westwards round the west side of Dambrae and Aikenshill. It then turns north-eastwards before crossing the existing A90 route just south of Foveran and progresses northwards parallel to the existing road before re-joining the existing road at Fountainbleau (see Photograph 22). The scheme ties into the existing dual carriageway at Tipperty.

There would be three major junctions along the route: to the south of Balmedie, at the A975 and to the south of Tipperty.

[25] It is considered unlikely that the road could be open before 2012/2013

3.2.2 Details of the Proposals

3.2.2.1 The Dual Carriageway

The new road would be a dual carriageway all purpose road, with two lanes in each direction (D2AP). Each carriageway would be 7.3 metres (m) wide with 1m hardstrips, 2.5m verges and there would be a 2.5m minimum central reserve. The design speed of the new road would be 120 kilometres per hour (kph). A typical section of the new dual carriageway is shown in Figure 3.2.

3.2.2.2 Junctions

Three junctions are proposed as part of the scheme:

- a grade separated junction at the south of Balmedie replacing the existing at-grade junction. The new junction would provide all-ways access from Balmedie village and also connect to a realigned B977 Dyce Road. A footway would be provided in the underpass on one side;
- a grade separated junction which would allow access between the A975 Newburgh Road and the A90(T) to the south. The junction would also allow access on to the local road network; and
- a grade separated junction south of Tipperty which would allow access between the B9000 and the A90(T) to the north as well as allowing for connections to the local road network.

The merge and diverge slip road tapers have been designed to motorway design-standard in accordance with Transport Scotland advice.

The central reserve gaps in the existing dual carriageway at Balmedie (see Photograph 4) and to the south of Tipperty would be closed off so that local traffic would have to use the new junctions to access or cross the dual carriageway. To meet safety standards two gaps in the central reserve south of Balmedie would also be closed off (see Section 2.4.7 and Figure 3.1a). Local access requirements would be met by the new Easter Hatton Link and the Millden Link Road (see Photograph 2). The gap in the reserve allowing access to the Blackdog Rifle Ranges and the timber yard near Black Dog would remain open. The gaps would be closed the Aberdeen Western Peripheral Route was built.

3.2.2.3 Structures

The following structures would be required:

- Balmedie Junction Underpass[26] (chainage (ch) -95027);
- South Orrock Underpass providing access between South Orrock and the existing A90 (ch1100);
- Orrock Overbridge facilitating access to Orrock House and Boghead (ch1920);
- Dambrae Underpass which maintains access to the side road network in that locality (ch2710);
- Aikenshill Farm Underpass which maintains field access for the farm (ch4230);
- Newburgh Road Junction Overbridge (ch 4835);

[26] Overbridge and underpass are defined in relation to the new dual carriageway
[27] Chainage is the distance in metres(m) from the southern end of the scheme at Balmedie (0000m) to the connection with the existing dual carriageway at the northern end of the scheme (9000m)

- Foveran Overbridge linking Foveran School Road with the existing A90 (ch 6180);
- Pitmillan Overbridge providing access between the existing A90 and the piggery at Pitmillan (ch 6930); and
- Tipperty Junction Overbridge (ch 7630).

The design of the structures would be similar to those shown in the ES but the structures would be detailed by the contractor's team. Use of hexagonal reinforced earth panels and gabion baskets would not be permitted. The new dual carriageway overbridges have been designed with 6.45m headroom to achieve clearance for the passage of abnormal high loads along the trunk road.

The following main culverts would be required:

- tributary of Millden Burn (ch -980)
- tributaries of Blairton Burn (ch 680 and ch 1450);
- tributaries of Menie Burn (ch 2380);
- Sandend Burn (ch 3390); and
- Foveran Burn and lade (ch 6050 and ch 6120).

Ledges to allow animal passage would be included in all these culverts.

The location of key scheme structures is shown on Figures 3.1 a-e.

Laybys would be provided approximately every 2.5km on the main-line and passing places approximately every 150m on:

- the side road from Orrock House and Boghead;
- the new access road at Hill of Menie Croft; and
- the realignment of the minor road east of Kirkhill.

3.2.2.4 Side Road Realignments

To facilitate local access various side road alignments are required as follows (see Figures 3.1a-e):

- the Easter Hatton Link to provide access for properties at Easter Hatton and the landfill site because of the closure of the gap in the central reserve at Easter Hatton. An extension of the road to the residential properties would be provided to the entrance to the Blackdog Rifle Ranges. The link would run parallel to the A90 and is some 0.65km in length (see Photograph 2);

- the Millden Link Road would be constructed to provide access for properties at South Folds, Millden, the East Aberdeenshire Golf Club and properties near the golf club. This is required because of the closure of the existing gap in the central reserve at Millden. The road (0.45km) would be constructed as a continuation of the existing road from properties at Millden to the golf club and would link to the junction at Balmedie passing through the golf driving range. A footway would be provided on one side of the link road;

- realignment of the B977, Dyce Road, from Drumhead to the new junction at Balmedie south. This realignment is some 1.51km in length and has been sited to minimise severance effects at Keir Farm and intrusion in the

landscape by following existing topographic features wherever possible. The realigned road would pass under the existing A90 dual carriageway. Access to the properties at The Holdings, south of Keir Farm would be via this B977 realignment. A footway would be provided from The Holdings and along the realigned B977 to meet the footway from the Millden Link Road and continue under in the underpass on one side to the Old Road in Balmedie;

- the existing A90 at Balmedie would be realigned to join with Old Road which runs north south through the village of Balmedie. The existing access to the Bungalow (see Figure 3.1b) would be retained. The redundant section of road would be removed and the ground restored. At the south end of the village Old Road would be slightly realigned to improve visibility into the new junction. The path into the houses to the east would be made good;

- the local minor road passing Orrock House and Boghead to the existing A90 would be realigned via the new Orrock Overbridge. A new access to Orrock House would be provided to tie in with the new overbridge;

- the track between Hill of Menie Croft and the Hill of Menie would be stopped up and a new access provided onto the new road which would lead to Dambrae Underpass;

- the access to Stoneyards from the current A90 would be stopped up east of Stoneyards Cottages and the track running east past Cowhill would be upgraded to provide access to the road leading to Dambrae Underpass;

- localised realignment of the minor roads at Kirkhill to link with the new A975 Newburgh Junction;

- the A975 would be realigned to link into the new Newburgh Road grade separated Junction. The existing A90 would continue past Rashierieve to tie-in to the realigned road allowing access to be maintained to Southlea and the steel fabrication yard. Redundant sections of the existing A90 and the A975 would be grubbed up and returned to agriculture28;

- an off-line realignment of the minor road from the existing A90 east of Foveran by means of an overbridge. The new works would tie in to the existing road immediately west of the Mill of Foveran;

- realignment of the current access to Pitmillan farm from the existing A90 would be stopped up and access provided via Pitmillan Overbridge; and

- provision of a new link from the southern end of Tipperty village to the B9000 Pitmedden Road allowing access to the local network as the existing access to the A90 would be closed.

The existing underpasses under the A90 dual carriageway at Keir Farm and Tipperty would remain open. The steps leading up to the A90 from Balmedie opposite the Holdings would be removed because the central reserve would be removed (see Section 3.2.2.2).

[28] In agreement with the landowner

3.2.2.5 Embankments and Cuttings

Earthworks for the scheme have been kept to the minimum necessary to achieve engineering standards and allow construction through local topography (see also Section 3.3.7).

Some embankment side slopes have been smoothed to allow the land up to the road boundary to be returned to agriculture. The typical gradient where this approach has been adopted is 1:10. The locations are:

- 0.39ha on west side of the main alignment between ch1300 and ch1500;
- 3.35ha on east side of main alignment between ch3400 and ch4000;
- 1.77ha of LCA Class 32 land on east side of main alignment between ch4800 and ch5300;
- 6.35ha land on west side of main alignment between ch5300 and ch6000; and
- 2.24ha land on east side of main alignment between ch7100 and ch7600.

3.2.2.6 Noise Barriers

Noise barriers (earth bunds and/or fencing) would be provided where the noise appraisal (see Chapter 14) has indicated there would be benefit and where landscape intrusion of the features would not be unacceptable. The location of noise barriers has been evolved through iterative design between the noise and landscape teams. The location of noise barriers is shown on Figure 11.7a-h.

3.2.2.7 Safety Barriers

Safety barriers for all new works would be provided as required by current standards. Vertical concrete barriers would not be used. An open type of barrier would be chosen to give the desired level of containment and safe working widths required.

3.2.2.8 Drainage

All surface water run-off would be collected by means of roadside filter trenches draining to detention ponds or swales prior to outfalling into local watercourses. The detention ponds would offer a secondary level of treatment and hold the designed treatment volume for 24 hours allowing treatment of the run-off (settling sediment out etc). Shut-off valves will be provided in order to control any potential oil spills.

Run-off arriving at the road boundary from adjacent land would be collected using cut-off drains which would drain directly into the existing watercourses.

Nine watercourses have been identified for drainage outfall purposes. These include the Blairton Burn, Sandend Burn, Foveran Burn and Tarty Burn (see Section 9.8.1).

3.2.2.9 Signing and Lighting

The new dual carriageway would not be lit. Approaches to Balmedie Junction roundabouts would be lit (the current junction and dual carriageway near Balmedie are lit) and lighting would be installed at the roundabout at Tipperty Junction.

Advance direction signs would be located along the scheme in order to inform drivers of approaching junctions. These would be located 800m prior to the start of the slip road tapers and similarly at commencement of the taper. Countdown markers would also be located 300m, 200m and 100m from commencement of the tapers.

Other signs which are all smaller in size than advance direction size would be provided such as route confirmatory signs down stream of merge slip roads.

A VMS[29] sign would be installed on the southbound carriageway at Balmedie north to allow Traffic Scotland[30] to display messages on travel conditions further south (see Figure 3.1b).

3.3 CONSTRUCTION

3.3.1 Introduction

All construction work would be undertaken following legal requirements and best practice guidance including (but not restricted to):

- the requirements of the Water Environment (Controlled Activities) (Scotland) Regulations 2005;
- SEPA Best Practice Management Guidance (www.sepa.org.uk);
- relevant CIRIA guidance including the Environmental Good Practice on Site31 Guide and Control of Water Pollution from Linear Construction Projects;
- Design Manual for Roads and Bridges; and
- Manual of Contract Documents for Highway Works 32.

3.3.2 The Contract

It has been assumed for this EIA that the scheme would be procured using a Design and Build[33] type contract following a competition between a number of tenderers.

Construction assumptions and design details have been used for the EIA based on best available information and information about the proposals. Should the scheme and/or methods of construction differ from those assumed in this ES Transport Scotland, as scheme promoter, would consider whether the new proposals would result in any significant adverse effects different from those of the current design and construction assumptions. If the potential for significant effects was identified then an addendum to the ES would be required and this would be published for public comment (see Section 1.4).

[29] Variable Message Sign
[30] Traffic Scotland enables the collection and distribution of real-time traffic information relating to incidents and events currently taking place on the Scottish trunk road network
[31] C650 Environmental good practice on site (Second Edition). CIRIA, 2005 and CIRIA, Control of Water Pollution from Linear Construction Projects, Technical guidance (C648)
[32] Department of Transport/ Scottish Office Industry Department/Welsh Office/ Department of Environment for Northern Ireland. 1992 Manual of Contract Documents for Highway Works, Volume 1: Specification for Highway Works. HMSO. Department of Transport/ Scottish Office Industry Department/Welsh Office/ Department of Environment for Northern Ireland
[33] Contactors are invited to bid for the scheme developing the outline design described in this ES to detailed stage

As part of the contract the chosen contractor would be required to implement all committed mitigation measures including those set out in this ES and to maintain measures such as fencing and landscaping during the maintenance period. Successful implementation of mitigation would be audited by Transport Scotland's environmental representative on site. At the end of the contract routine maintenance would pass to Transport Scotland's term maintenance contractor (see Section 3.5.1).

3.3.3 Programme

Construction is estimated to take some 18 - 24 months with the contractor responsible for defects correction for a period of 5 years after the scheme opening.

The scheme has the potential to be constructed in three phases:

- Phase 1 – Balmedie Junction;
- Phase 2 – Balmedie to Newburgh Road Junction; and
- Phase 3 – Newburgh Road Junction to Tipperty Junction

The detailed construction programme would be the choice of the chosen contractor.

3.3.4 Employment

The number of persons employed on site would be dependant upon the construction programme; however, in excess of one hundred persons are likely to be employed during the most intense phases of the works. It is normal practice for contractors to seek local labour to supplement their own resources. It is also likely that the contractor would seek to sub-contract sections of the works with local contractors given the opportunity to tender for this work therefore it is likely that an element of the site staff could be from the local area.

3.3.5 Construction Activities

Details of the chosen construction methods and location of the site compound(s) would be the responsibility of the chosen contractor. It has been assumed that all construction activities would be carried out in the corridor within the boundary of the land to be acquired for the permanent and temporary works between Balmedie and Tipperty. However additional temporary occupational areas have been identified where considered appropriate to facilitate construction and included within the land to be purchased using compulsory purchase powers.

If the contractor chooses to use additional areas of land outwith the land made available for construction for the construction compound, temporary storage etc the contractor would be required to make all necessary arrangements including necessary permissions and licences.

It is likely that the contractor would seek some central location within the land made available boundary to act as its principal compound. This has the advantage of ensuring that the extremities of the works are accessed as quickly as possible. The location of the principal compound must also facilitate quick and easy connections into local utilities /services provision in order that the compound achieves operational status efficiently. The principal compound could be supplemented by smaller additional office/compounds for specific sections or elements of the works.

Access to the works would primarily be via the existing A90. Access would also be required to parts of the works via the minor road network in proximity to the scheme to facilitate the required works. Roads which construction traffic would be permitted to use would be agreed with Aberdeenshire Council and listed in the contract and use of other minor roads prohibited.

The majority of works would be undertaken independent of the local road network since the new dual carriageway would be predominantly off-line. At the initial stages of construction the entire site would be fenced off and a haul route created along the construction corridor. This would allow movement of plant and materials, and at points where the haul roads cross existing roads temporary traffic signalised junctions would be created. These are assumed to be at the following locations:

- access to South Orrock;
- public road leading to Orrock House;
- public road at Dambrae;
- public road at Kirkhill;
- A90 South of Foveran;
- public road at Foveran; and
- access to Pitmillan.

Once the side road bridges were constructed the haul route would become grade-separated at these locations.

The only area of online construction is at Balmedie south where lane restrictions down to one lane in each direction would be sufficient to provide working space for the contractor. A temporary diversion, parallel and immediately to the east is likely to be needed, as is the closure of the Balmedie south access. In this case local traffic would be diverted via the existing Balmedie north junction.

The works would cross the existing trunk road south of Foveran and also tie-in to the corridor at Tipperty. During such works some temporary diversions might be constructed adjacent to the works. In general two lanes of traffic would be provided for at all times.

Most of the side road bridges are located off the line of the current route, with the exception of the local road at Dambrae. In this instance a temporary diversion of the side road would be constructed in order to maintain access.

3.3.6 Working Hours

It has been assumed for the EIA that construction activities would be undertaken during daytime periods assumed to be 08.00 to 19.00 Monday to Friday and 08.00 to 13.00 on Saturday. Occasional night and Sunday working would be required, for example, to allow erection of superstructures at bridge sites to minimise traffic disruption on the local road network. Noise limits and working hour restrictions would be agreed with Aberdeenshire Council and specified in the contract documents. The contractor would be required to get permission in advance from Aberdeenshire Council Planning and Environmental Health Services Department for any work outwith normal hours.

3.3.7 Earthworks

Scheme construction would involve activities which would result in the requirement for fill (probably sourced from the site), excavations and generation of spoil and other waste materials which if not used in on-site features would require off-site disposal (see Section 3.2.2.5).

It has been estimated that some 1,333,000m^3 of material (excluding 325,500m^3 of topsoil) would be excavated of which 733,000m^3 could be re-used in engineering embankments ('suitable' material) and 600,00m^3 which is unsuitable for engineering purposes but much of which could be used for landscape and visual mitigation purposes, acoustic bunds and to allow side slopes of embankments to be graded for agricultural purposes. Apart from where land would be returned to agriculture (see Section 3.2.2.5) it has been assumed that cut slopes would be 1 in 2 whilst fill slopes would be 1 in 3.

The initial earthworks operation would be a staged topsoil strip from within the footprint of the road scheme. The topsoil would be transported to various designated landscaping areas which would be used as temporary storage until later when a proportion would be used to soil the side slopes and the verges. Any surplus soil would be used to provide shape to the landscaping areas and around the detention ponds, and also to form some noise and visual impact reduction mounds. After topsoil stripping, the next activity would be the excavation, transportation and depositing of the earthworks materials generated in areas of cutting (including detention ponds).

The scheme is likely to be divided into two or three sections by the contractor with a view to keeping the transportation of excavated 'cut' subsoil material suitable for embankment fill material to a minimum. The three major junctions: Balmedie; Newburgh; and Tipperty, together with a number of 'cutting' sections along the mainline, all offer potential areas where substantial material can be 'gained' for re-use as fill material. Adjacent embankment locations offer a place where this material can be deposited. On-site landscape areas also provide locations for use as temporary holding areas for acceptable fill where there is the possibility that the contractor may need more fill in a particular area, or for placing surplus material without needing to find additional off-site tips.

3.3.8 Construction Traffic

Initially, the existing road network would be used for the transportation of material. Good working practice would suggest that the contractor would wish to establish a haul road(s) through the site to transport material and this would be encouraged by Transport Scotland. This would have the benefit of reducing the disturbance to the local road network and community. However, the location of the Balmedie Junction, remote from the remainder of the scheme, would necessitate the use of the A90 route for some transportation.

3.3.9 Traffic Management

The primary objectives of traffic management during the construction period would be to keep traffic as safe and as free from disruption as possible and to allow safe access for construction traffic to works areas.

The majority of construction of the new dual carriageway section would be off-line which would reduce the potential for disturbance on the A90.

Locations where traffic management measures would be put in place include:

- tie-ins to the existing A90 which would require contraflows[34]; and

- disruption on local roads to allow construction of structures. The main areas with potential for disturbance are at South Orrock and Dambrae. Construction of structures off-line such as the Foveran Overbridge would reduce the potential for disruption.

A more detailed description of the effects of scheme construction traffic on the strategic and local network is provided in Chapter 4 and an assessment of the environmental effects of predicted changes in traffic movements is presented in Chapter 13 (Disruption due to Construction). An example of possible traffic management measures is shown on Figure 13.1.

3.3.10 Environmental Management and Community Liaison

The contractor would be required to produce and implement an environmental management system (EMS) which complies with the requirements of ISO 14001[35]. The EMS would set out procedures to ensure all activities with potential to affect the environment are appropriately managed. All environmental risks and necessary protection measures (including mitigation measures set out in the ES) would be required to be identified and integrated in the contractor's method statements for all major construction activities.

All site staff would receive appropriate environmental training at the beginning of the contract and throughout the construction period as required. The contractor's compliance with environmental procedures would be audited on site at regular intervals during the construction works by Transport Scotland's environmental representative.

The contractor would be required to establish and maintain effective liaison with the local community throughout construction. This would include information about ongoing activities and provision of contact telephone numbers to contact the site for information during operational hours. A person would be identified with appropriate authority to resolve any problems. A log of complaints and actions taken to remedy these would be available for inspection.

The contractors would be required to ensure disturbance to the local community from construction activities was minimised to that required for safe implementation of the works.

3.4 SUSTAINABILITY OF THE PROJECT

The importance of including sustainable development principles in civil engineering projects is widely recognised. Scottish Planning Policy (SPP)1 The Planning System, refers to sustainable development as a key objective of the planning system: *Planning decisions should favour the most sustainable option, promoting development that safeguard and enhances the long term needs of the economy, society and the environment* (see Chapter 5).

[34] Traffic travelling in both directions on one side of the road
[35] ISO 14001 is an international standard for environmental management

Sustainability principles which have been included in the development of the project to date and would be incorporated during construction include:

- optimising the re-use of site won materials;
- optimising use of local materials;
- using Sustainable Urban Drainage Systems (SUDS);
- designing the scheme to reduce impacts to people and the natural and cultural environment where possible; and
- designing the landscaping proposals to enhance local biodiversity in the longer term.

3.5 MAINTENANCE ACTIVITIES

3.5.1 Routine Maintenance

Following completion the contractor would be responsible for defects over a set period after which routine maintenance would be undertaken by Transport Scotland's term maintenance contractor. Activities would include landscaping maintenance, grass cutting, snow clearing, gritting, cleaning of drainage systems and upkeep of lighting.

3.6 GENERAL MITIGATION MEASURES

General mitigation measures including those contained within the first chapters of the ES are summarised below:

GEN1. Where final scheme details could vary from those described in the ES, the terms of the contract would ensure that the resulting effects were no greater than those reported in the ES. If there were significant differences in the predicted effects of the scheme an addendum to the ES would have to be published for public consultation and comment and consideration by Transport Scotland and Scottish Ministers.

GEN2. Consultations and discussions with key stakeholders would continue through the contract.

GEN3. The contractor would be required to obtain all necessary permissions and consents for use of land outwith the land made available for the contract.

GEN4. The contractor would be required to securely fence off the area of the works in advance of construction in order to protect public safety and ensure that there is no unauthorised public access to the site.

GEN5. The contractor would be required to manage traffic on the A90 and on local roads safely and efficiently through the works to ensure the risk of delay and inconvenience was reduced to the minimum necessary for the works.

GEN6. Temporary signs would be employed during the life of the contract to warn drivers in advance about the presence of any queues and anticipated delays.

GEN7. Working hours would be agreed with Aberdeenshire Council and set out in the contract. At present they are assumed to be 08.00 to 19.00 Monday to Friday and 08.00 to 13.00 on Saturday. All night time and Sunday working would be agreed in advance with Aberdeenshire Council.

GEN8. Noise limits for construction would be agreed with Aberdeenshire Council and set out in the contract.

GEN9. Access to all properties would be maintained during construction and operation of the scheme.

GEN10. The contractor would be required to maintain effective liaison with local communities close to the construction area. This would include circulation of information about ongoing activities and a contact telephone number for use by the local community to contact the contractor for information. The telephone would be operated during operational hours and person(s) with appropriate authority to resolve any problems that occur would be available. A log of all complaints and actions taken would be kept and made available for inspection.

GEN11. The contractor would be required to produce and implement an Environmental Management System (EMS) for the construction and maintenance period.

GEN12. Compliance with the EMS would be audited at regular intervals by Transport Scotland's representative on site.

GEN13. The scheme drainage would include appropriate sustainable urban drainage system measures.

GEN14. Ledges to allow animal passage would be included in culverts.

GEN15. Vertical concrete barriers would not be used in the works.

GEN16. Use of hexagonal reinforced earth and gabion baskets in the works would not be permitted.

GEN17. Redundant sections of road would be restored to agriculture or the surrounding land use unless the land owner requested the areas to be left for another purpose.

GEN18. The new road and associated works would only be lit where essential to comply with current safety standards.

4 TRAFFIC

4.1 INTRODUCTION

This chapter provides an overview of the traffic appraisal undertaken by Grontmij for the Balmedie to Tipperty scheme. The appraisal has been based on traffic surveys undertaken in November 2005 from which a local traffic model was created. The existing road network is shown in Figure 4.1.

The traffic effects are described for the new A90 dual carriageway as well as changes in traffic on the wider network. The environmental implications of the predicted changes in traffic flows are reported elsewhere in this document, in particular the chapters dealing with disruption due to construction (Chapter 13), noise and vibration (Chapter 14), air quality (Chapter 15), pedestrian, cyclists, equestrians and community effects (Chapter 16) and vehicle travellers (Chapter 17).

4.2 ASSESSING TRAFFIC CHANGES

The completion of the A90 dualling from Balmedie to Tipperty would result in changes in the flow of traffic within the corridor as well as on some local roads in the vicinity of the A90. It is not anticipated that there would be any induced traffic effects, i.e. an increase in traffic volume as a result of new trips in the area. Therefore the overall level of flows modelled are the same before and after the opening of the scheme. Traffic flow changes have been predicted using a computer modelling software, NESA (Network Evaluation from Surveys and Assignment). NESA is a computer programme developed by Transport Scotland for the traffic and economic appraisal of trunk road schemes. The primary purpose of the traffic model is to evaluate the main effects and economic performance of the scheme. This includes the re-assignment effects that are a consequence of the junction strategy. The traffic flows on this part of the network can also be affected by other projects outwith the extent of the scheme. In particular, the implementation of the Aberdeen Western Peripheral Route (AWPR) would result in a transfer of some 2,000 vehicles per day (at 2025 traffic levels) on to the A90 from the parallel B999 route to the west. If the AWPR is not constructed this effect would not happen.

The modelled area follows the length of the A90 corridor between Blackdog, in the south, northwards to the B9005 junction leading to Ellon. It also includes an area to the east of the A90 comprising of the A975 and the B9000 which link through Newburgh village and the main roads that make up the urban network in Balmedie. The main side roads onto the A90 have been modelled where the level of traffic flows are significant (generally over 100 vehicles per day). By modelling these junctions NESA is able to account for the potential for accident reductions associated with through traffic transferring to the new dual carriageway.

The traffic effects of the scheme have been modelled for the following years:

- the base year 2005;
- the year of opening 2010 (before the AWPR is constructed); and
- the design year 2025, 15 years after scheme opening allowing for general traffic growth between 2010 and 2025 and also assuming the AWPR has been implemented.

For 2010 and 2025, predicted traffic flows for the A90 dualling from Balmedie to Tipperty scheme have been compared with the forecast traffic movements for the same year which would occur without the scheme. A number of assumptions have been made about planned development in Balmedie. These include the development to the south of Balmedie with 12,500m^2 of industrial units, 1,365m^2 of business centre and 104 residential units (see Section 5.5).

The daily two-way traffic flows, are shown on Figure 4.2. The diagram shows that traffic flows on the new alignment for B977 reduce from 4,300 in 2010 to 1,000 in 2025. This is because the proposed AWPR provides a more direct route between Balmedie and Dyce in the future. Mitigation of properties along this route has however been considered on the basis of the higher traffic flows experienced in 2010 as a worst case scenario and in case the AWPR is never constructed.

4.3 TRAFFIC EFFECTS DURING CONSTRUCTION

4.3.1 Traffic Effects on Trunk Road

The new dual carriageway would tie into the existing roads at its northern and southern extremities, as well as crossing the existing trunk route immediately north of the A975 Newburgh Road Junction. Construction of the Balmedie Junction would include temporary diversion of traffic during construction of the new junction. These temporary diversions would be likely to result in temporary closure of the right turn into and out of Eigie Road (see Figure 3.1b), with diversions signposted via the junction to the north of the village. For the purposes of appraisals in this ES it has been assumed this diversion would be in place for 12 weeks. There would also be lane restrictions in the area such that a minimum of one lane in each direction was always available.

The Newburgh Road and Tipperty Junctions would be constructed offline and as such would not require any traffic management measures. The crossing of the existing A90 north of the A975 would be constructed in a sequence that ensured continued two way flow of trunk road traffic at all times. This may involve some localised diversions onto temporary roads.

The exact number of movements for construction traffic would depend on the detailed design for the scheme and the way the contractor plans the works. The assumptions for external HGV movements presented in Table 4.1 have been used to inform the appraisal of effects in this EIA.

The activities shown in Table 4.1 would occur throughout the construction period over 18-24 months. The daily average for HGV movements would therefore be in the order of 80 movements per day. A worst case assumption would be that all HGVs approach on the A90 from the south. In this scenario the increase in HGVs on the A90 past Balmedie would equate to a 6% increase, which is not considered to be significant. The analysis of effects of disruption due to construction are considered in Chapter 13 and noise in Section 14.8.2.

Table 4.1: Assumed Construction Traffic Generation Outwith Works Areas[36]

Activity	Approximate Quantity of Material for Transportation	Approximate Number of HGV Movements Generated.
Transport of soils on A90 from Balmedie south to works areas further north	170,000m^3	17,000
Import of concrete for structures	10,000m^3 concrete	1,600
Import of steel for structures	3,000 tonnes	300
Import of road pavement products	100,000m^3	10,000
TOTAL HGVs		28,900

4.3.2 Possible Alternatives to the Trunk Road

An alternative route to the north is via the B999 which runs parallel with the A90 and is approximately 3km to the west. This route is capable of providing access to isolated properties that are situated on side roads that may be temporarily affected by the works. The A975/B9000 also provides an alternative route for traffic diverting in the northern section of the scheme, although this would not be encouraged because the route passes through the village of Newburgh.

4.3.3 Traffic Management

During construction existing capacity would generally be maintained on the A90 in both directions so that disruption would be minimal. There may be occasional exceptions to this where short-term lane closures would be required during off-peak periods to allow certain elements of work to be completed.

4.3.4 Summary

The scheme construction is anticipated to be undertaken in a sequence that minimises disruption to existing traffic on the trunk road and local connections. Whilst some disruption is inevitable, traffic management strategies would be planned in advance and implemented to minimise disruption. There would be some local traffic effects where the works cross existing roads. However, the effect of any restrictions would be minimised by undertaking construction in a sequential manner.

4.4 OPERATIONAL TRAFFIC EFFECTS

The proposed A90 dualling from Balmedie to Tipperty would provide the missing link in a dual carriageway running from Aberdeen to Ellon and would improve the reliability of the strategic transport network in the area. The traffic model indicates that the scheme would provide operational benefits to users through reduced journey times, elimination of platooning and opportunities to improve the reliability of public transport. This is confirmed by the cost benefit analysis undertaken that indicates good value for money over the 60 year evaluation period.

[36] Estimates of HGV volumes are based on the following assumptions:
a) 10m^3 of soil / topsoil material per load
b) 6 m^3 of concrete per load
c) 10 tonnes of steel per load
d) 10 m^3 of road pavement product per load

A worst case assumption has been made that there is no back loading for vehicles. A movement therefore represents two journeys – to and from the point of delivery

The predicted future patterns for traffic in 2010 and 2025 with the A90(T) in operation are shown on Figure 4.2. The existing traffic pattern is tidal with 75% of traffic travelling southbound in the AM peak and a similar northbound effect in the PM peak. The Annual Average Daily Traffic (AADT) flow on the new A90(T) would be as follows:

- between Balmedie South and the Newburgh Road Junction 23,200 in 2010 rising to 28,700 in 202537; and
- between the Newburgh Road Junction and Tipperty Junction 18,800 in 2010 rising to 23,400 in 2025.

In 2010 the traffic on the existing A90 would reduce accordingly as follows:

- between Balmedie north and the Newburgh Road Junction the flow would reduce from 23,700 to 600 vehicles per day;
- between the A975 Newburgh Road Junction and Foveran the flow would reduce from 19,700 to 900 vehicles per day; and
- between Foveran and B9000 Junction the flow would reduce from 20,200 to 1,300 vehicles per day.

It is assumed that most of the HGV movements would transfer from the A90 to the A90(T) apart from local deliveries and that the % HGVs on the A90(T) would remain about 11% (i.e. approximately 2,600 heavy good vehicles per day in 2010).

The junction strategy for Balmedie would result in some local re-locating for traffic within the community since the Balmedie North Junction would be closed. The increased traffic flows on the southern sections of Old Road and Eigie Road would be well within the operating capacity of this section of the local network. The scheme would not result in any significant re-routing of traffic in any other areas.

4.5 SUMMARY

Key traffic effects from the scheme can be summarised as follows:

- The proposed A90 dualling from Balmedie to Tipperty would provide the missing link in a dual carriageway running from Aberdeen to Ellon and would improve the strategic transport network in the area.
- The provision of this new infrastructure would improve the reliability and safety of journeys for all users, including freight and public transport services and local traffic.
- During construction there could be some 6% increases in daily HGV movements on the A90 between Balmedie south and north junctions over a 24 week period as earth is moved from the site of the new Balmedie Junction to the rest of the site.
- At other times during the contract there would be increases in traffic as result of construction related activities but these would be less than the increases during the earthworks.
- The scheme construction would be undertaken with minimal disruption to existing traffic on the local road network. Whilst some disruption is inevitable,

[37] All 2025 traffic flows assume the AWPR is constructed (see also Section 4.2)

traffic management strategies would be planned in advance and implemented to minimise disruption. There would be some local traffic effects where the new road crosses existing roads. However, the effect of any restrictions would be minimised by undertaking construction in a sequential manner.

- The traffic effects have been appraised on the basis of a transfer of traffic from the existing trunk road. No significant induced traffic effects are anticipated. Annual Average Daily Traffic (AADT) flows on the A90(T) is predicted to be up to 23,200 in 2010 and 28,700 in 2025.
- The traffic on the existing A90 would reduce from around 20,000 AADT to around 1,000 AADT on opening of the scheme in 2010.

5 THE TRANSPORT AND PLANNING POLICY CONTEXT

5.1 INTRODUCTION

This chapter reviews the national, strategic and local planning policies relating to the proposals. The extent to which the proposals comply with these policies is assessed. The effects of the development proposal on extant[38] planning applications and permissions and other known or anticipated future developments are also considered.

National planning policy in Scotland is set out in National Planning Policy Guidelines (NPPGs). These documents are currently under review and are being replaced by revised guidance, Scottish Planning Policies (SPPs). Advice on good practice is set out in Planning Advice Notes (PANs) and this is discussed where relevant.

5.2 SOURCES OF INFORMATION

- Published documents;
- Aberdeen and Aberdeenshire Structure Plan – 'North East Scotland Together', 2001-2016;
- The Aberdeenshire Local Plan (ALP), Adopted June 2006; and
- meetings with Aberdeenshire Council Planners (see Annex A).

5.3 NATIONAL PLANNING POLICY REVIEW

This section reviews national and transport planning policy relevant to the A90 upgrade. Only policy and guidance relevant to the road upgrade development proposals are assessed.

Scotland's National Transport Strategy (December 2006)[39]

Scotland's National Transport Strategy builds on the Transport White Paper of 2004 and outlines how the vision and objectives set out in the white paper can be implemented throughout the country. The strategy sets out three key strategic outcomes that must be focussed on. They are to:

- improve journey times and connections, to tackle congestion and the lack of integration and connections in transport which impact on the high level objectives for economic growth, social inclusion, integration and safety;
- reduce emissions, to tackle the issues of climate change, air quality and health improvement which impact on the high level objective for protecting the environment and improving health; and
- improve quality, accessibility and affordability, to give people a choice of public transport, where availability means better quality transport services and value for money or an alternative to the car.

The A90 upgrade between Balmedie and Tipperty would improve connections and travel time and reduce congestion along the existing A90 as well as the A90(T). The upgrade would also improve the public transport system in the area by reducing congestion on the existing A90, enabling buses to run on time.

[38] Extant: still live
[39] Scottish Executive, 2006. Scotland's National Transport Strategy. Scottish Executive, December 2006

Scotland's Transport Future: The Transport White Paper (June 2004)[40]
Scotland's Transport White Paper sets out the challenge to transform Scotland's transport. It encourages the promotion of economic growth and social inclusion through transport and looks towards creating a safer, integrated and less environmentally damaging transport system. The paper does not make direct reference to specific trunk road schemes, but notes that Scotland's trunk road network will be developed for overall efficiency and more specifically for the promotion and use of freight traffic. The A90 Balmedie to Tipperty upgrade would improve travel times and safety for freight traffic in the north east of Scotland by increasing traffic flow and decreasing platooning of traffic (see Chapter 4).

Travel Choices for Scotland: Strategic Roads Review (November 1999)[41]
This paper reports a comprehensive review of the factors giving rise to the pressures for improvements to the Scottish trunk road network in the next decade. The review was undertaken on the basis of the Government's New Appraisal Methodology (NAM) which sought to appraise all the schemes in the trunk road programme on the basis of the five key criteria of integration, economy, safety, environment and accessibility. As a result of the review, a number of road schemes were proposed to be taken forward (as 'Scheme Decisions'). The A90 upgrading Balmedie to Tipperty was put on hold to be considered alongside other emerging priorities for inclusion in future trunk road programme (see Section 1.4).

Trunk Road Biodiversity Action Plan: Review for Discussion (August 2000)[42]
This paper is a 'review for discussion' which aims to manage the biodiversity of trunk road corridors in Scotland and assist in the delivery of biodiversity targets and objectives as set down in the Scottish Local Biodiversity Action Plans (LBAPs). It looks to adopt practices which help to maintain and enhance the biodiversity of trunk road corridors, identify all designated sites adjacent to trunk roads, and ensure that the operation and maintenance of the road does not adversely affect them. This scheme provides an opportunity to enhance local biodiversity through landscape mitigation planting (see Sections 10.9, 11.7.4 and Figures 11.7a-h).

Scotland's Transport: Delivering Improvements (March 2002)[43]
With an aim to improve transport across all modes in Scotland whilst tackling the key transport challenges of congestion, integration and completing missing links, this report aims to build a sustainable, effective and integrated 21st century transport system. It considers Scotland's trunk road network and its upgrade as an important part of an integrated transport strategy and recognises that the Scottish Executive will make significant investment in the motorway and trunk road network to fund regular maintenance and repair of the existing network and to deliver new schemes.

[40] The Scottish Executive (2004) Scotland's Transport Future – The Transport White Paper. The Scottish Executive
[41] The Scottish Executive Development Department Planning Services. (1999) Travel Choices for Scotland: Strategic Roads Review. The Scottish Executive
[42] The Scottish Executive (2000) Trunk Road Biodiversity Action Plan: Review for Discussion. Scottish Executive
[43] The Scottish Executive (2002) Scotland's Transport: Delivering Improvements. The Scottish Executive

SPP 1: The Planning System (November 2002) [44]
SPP1 defines the primary objectives of the planning system as being:

- to set the land use framework for promoting sustainable economic development;
- to encourage and support regeneration; and
- to maintain and enhance the quality of the natural heritage and built environment.

SPP 1 sets out guidelines on how the planning system can achieve these objectives and ways in which the planning system should encourage sustainable development. The A90 upgrade between Balmedie and Tipperty encourages and supports regeneration through the upgrade of a key transport corridor (commuter and freight) connecting the north and south of Scotland. During the planning, pre-construction, construction and post-construction phases of the A90 upgrade, effects on the natural heritage and built environment would be mitigated where appropriate (see Chapters 10, 11 and 13).

SPP 17: Planning for Transport (August 2005) [45]
SPP 17 sets out the Scottish Executive's focus on transport policy as the delivery of transport projects and the positive role land use and transport planning takes in supporting and building upon the Scottish Executive's transport delivery agenda.

The key objectives of SPP17 are as follows:

- the transport network should support the economy, assist in reducing the need to travel, create the right conditions to promote sustainable transport nodes and restrict adverse environmental impacts;
- the interaction of accessibility, transport and the development strategy to be considered early in the planning process with land allocations taking into account transport opportunities alongside economic competitiveness and sustainable development;
- strategic land use plans to coordinate with Regional and Local Transport Strategies, and settlement strategies and identify where economic growth or regeneration requires additional infrastructure;
- local plans to relate new land use allocations to transport opportunities and constraints and locate new developments to maximise sustainable transport modes;
- development likely to affect trunk and other strategic roads to be managed so as not to adversely impact on safe and efficient strategic traffic flows. New trunk road or motorway junctions will only be considered exceptionally and will require significant developer funding; and
- roadside facilities to be considered under a special case for development affecting strategic routes. The comfort and safety of drivers should be accommodated through opportunities to stop and rest.

The relevant objectives of SPP17 have been taken into account in the development of the design of the proposed scheme wherever possible.

[44] The Scottish Executive Development Department Planning Services (2002) Scottish Planning Policy (SPP) 1: The Planning System. The Scottish Executive
[45] The Scottish Executive Development Department Planning Services (2005) Scottish Planning Policy (SPP) 17: Planning for Transport. The Scottish Executive

PAN 75: Planning for Transport (August 2005) [46]
PAN 75 accompanies SPP 17 (see above) and provides good practice guidance which planning authorities, developers and others should follow in their policy development, proposal assessment and project delivery. The document aims to create greater awareness of how linkages between planning and transport can be managed. It highlights the roles of different bodies and professions in the process and points to other sources of information. Relevant advice from PAN75 has been used and taken into account in the planning and development of the design of the road upgrade, for example the junction at Balmedie has been designed to provide the necessary infrastructure for the Local Plan aspirations for future housing and other developments in Balmedie (see Section 5.5.1)

Other Relevant Policy

NPPG 14: Natural Heritage January 1999[47] **PAN 60: Planning for Natural Heritage**[48] provide guidance on how the Government's policies for conserving and enhancing Scotland's natural heritage should be reflected in land use planning. The scheme is within 3km of the Ythan Estuary, designated as a Special Protection Area (SPA)[49], Special Area of Conservation (SAC)[50] and Ramsar[51] site in proximity to the proposed road upgrade. Information has been collated to inform an Appropriate Assessment (see Section 1.2.2) by Scottish Ministers of the potential impacts of the proposal on the international nature designations (see Chapter 10). There are also Foveran Links Site of Special Scientific Interest (SSSI), Sands of Forvie and the Ythan Estuary Site SSSI and Forvie National Nature Reserve (NNR)[52]. The impact of the proposed road upgrade on these sites is considered in Chapter 10. There would be no significant effects with implementation of all agreed mitigation

NPPG 18: Planning and the Historic Environment (April 1999) [53] provides the Government's guidance to planning authorities and developers on historic buildings and townscapes, historic gardens, designed landscapes and archaeological sites. Central to the Government's approach is the need to secure preservation whilst accommodating present day needs. There are recognised sites of historic value in proximity to the development proposals and the impact of the scheme on these sites is considered in Chapter 12 and mitigation defined.

NPPG 5: Archaeology and Planning (January 1994)[54] which sets out policy on handling archaeological issues in new developments. Archaeological surveys and

[46] The Scottish Executive Development Department Planning Services (2005) Planning Advice Note (PAN) 75: Planning for Transport. The Scottish Executive
[47] The Scottish Office (1999) National Planning Policy Guidance (NPPG) 14: Natural Heritage. The Scottish Office
[48] The Scottish Executive Development Department Planning Services (2000) Planning Advice Note 60: Planning for Natural Heritage. The Scottish Executive
[49] Special Protection Area (SPA) are designated under the EC Directive on the Conservation of Wild Birds (79/409/EEC), implemented in the UK under the provisions of the Conservation (Natural Habitats &c) Regulations 1994 (the Habitats Regulations)
[50] Special Area of Conservation (SAC) are areas designated under the Habitats and Species Directive (92/43/EEC),), implemented in the UK under the provisions of the Conservation (Natural Habitats &c) Regulations 1994 (the Habitats Regulations)
[51] Wetlands of International Importance designated under criteria agreed at the Ramsar Convention, Iran 1971
[52] National Nature Reserve (NNR): designated under the National Parks and Access to the Countryside Act, 1949 to conserve areas of importance for nature as well as allowing access to the areas for public enjoyment
[53] The Scottish Office (1999) National Planning Policy Guidance (NPPG) 18: Planning and the Historic Environment. The Scottish Office
[54] The Scottish Office (1994) National Planning Policy Guidance (NPPG) 5: Archaeology and Planning. The Scottish Office

evaluation have been carried out and mitigation measures are set out in Section 12.7.

Scottish Environment Protection Agency (SEPA) Policy 19: Groundwater Protection Policy for Scotland (2003)[55]. This policy aims to provide a sustainable future for Scotland's groundwater resources by protecting legitimate uses of groundwater and providing a common SEPA framework to protect groundwater quality by minimising the risks posed by point and diffuse sources of pollution and maintain the groundwater resource by influencing the design of abstractions and developments which could affect groundwater quantity. The potential impacts of the scheme on groundwater are assessed in Chapter 9 and mitigation has been defined to protect the resource.

SEPA Policy 26: Policy on the Culverting of Watercourses (1998)[56]. This policy sets out the environmental issues associated with culverting and ways in which the impact of culverting on the environment can be mitigated. The potential impacts of the required watercourse culverts are assessed in Chapter 9.

5.4 STRATEGIC PLANNING POLICY

Strategic planning policy is set out in the Aberdeen and Aberdeenshire Structure Plan *North East Scotland Together* 2001-2016[57]. The plan serves the role of:

- focussing national guidance on the area's land use issues;
- coordinating activity by partners where it affects the use of land; and
- setting the scope, limits and objectives for detailed local plans which govern the use of the land.

The Structure Plan provides the framework for improvements to the main road network such as the A90.

An appraisal of the structure plan policies of relevance to the proposals is presented in Table 5.1.

5.5 LOCAL PLANNING CONTEXT

Aberdeenshire Wide

Local planning policy covering the development area is set out in the Aberdeenshire Local Plan (ALP)[58] (adopted 30 June 2006). The policies relevant to the proposed development along with an appraisal of compliance are given in Table 5.2.

[55] Scottish Environmental Protection Agency (2003) Policy Number 19: Groundwater Protection Policy for Scotland. Scottish Environmental Protection Agency

[56] Scottish Environmental Protection Agency (2003) Policy Number 26: Policy on the Culverting of Watercourses. Scottish Environmental Protection Agency

[57] Aberdeen and Aberdeenshire Council (2001) Aberdeen and Aberdeenshire Structure Plan (2001 – 2016). North East Scotland Together

[58] Aberdeenshire Council (2006) Aberdeenshire Local Plan (ALP). Aberdeenshire Council

Table 5.1: Aberdeen and Aberdeenshire Structure Plan Policy Appraisal

Structure Plan Policy Number[59]	Nature of Policy	Appraisal
17: Countryside and Open Space Access	Policy detailing the responsibility of Local Plans to encourage and protect responsible access to the open space, countryside, coast and inland water by promoting and protecting a network of routes and facilities throughout the North East	Road upgrading would provide better access to this part of Aberdeenshire and all informal rights of way, footpaths, bridleways etc would be preserved and/or reinstated (see Chapter 6 and 16)
19: Wildlife, Landscape and Land Resources	Policy to safeguard the natural environment especially against development which would have an adverse effect on an international, national, regional or local designations Where development is allowed to take place which could affect the above designated sites, including beyond their boundaries, appropriate measures should be taken to conserve and enhance the site's ecological, geological or geomorphological interest Development outwith designated areas should be sited and designed to avoid adverse impacts on the natural environment	The scheme is within 3km of Ythan Estuary SPA, SAC and Ramsar site and other nature designations such as SSSIs and NNRs Information has been collated to inform an Appropriate Assessment of the potential impact of the proposal on international nature designations (See Chapter 10) Potential impacts to designated areas, appropriate mitigation and an appraisal of residual effects is presented in Chapter 10. No significant effects have been identified
20: Built Heritage and Archaeology	This policy has been set to safeguard the built and archaeological heritage of the region, particularly to encourage enhancement, active use, conservation and access wherever possible	There are several Scheduled Ancient Monuments, Listed Buildings and Archaeological Sites in the proximity to the proposed scheme Mitigation measures would ensure that there would be minimal impact to the built and archaeological heritage Potential impacts to designated sites, appropriate mitigation and an appraisal of residual effects is presented in Chapter 12. The new road would have moderate effects on the setting of Hare Cairn SAM and Orrock House (an A Listed Building)
21: Design	Policy to encourage an improvement in the general standard of design of developments	Development has been designed in accordance with current design best practice
22: Water Management	The focus of this policy is for the council to work with appropriate agencies to identify flooding issues including risks, flood management and flood protection schemes where necessary and proposals for sustainable water management practices	Appropriate agencies such as SEPA have been consulted (see Annex A) and potential impacts on flooding and mitigation measures are considered in Section 9.7, 9.8 and 9.9. The new road would have no significant effects on flooding
27: Greenbelt	This policy is set out to safeguard the are of Aberdeen Green Belt	The proposals are not located in a designated greenbelt area
30: The Main Communications Network within the North East and Beyond	Policy stating that improvements to the main communications network must support the development framework, contribute to the modern transport system and reflect the need to reduce travel, particularly by car Aberdeenshire Council will encourage the Strategic Rail Authority, Trunk Road	The proposals support the development framework and contributes to the modern transport system and Aberdeenshire Council's aspirations for transport in the area The proposals do not comply in that they do not support modal

[59] Only relevant policies are referenced

Structure Plan Policy Number[59]	Nature of Policy	Appraisal
	Authority and other relevant agencies to improve rail, road, port, pipeline and airport infrastructure	shift, however the proposals would not promote significant traffic growth (see Chapter 4)
31: Connecting Communities Within the North East	This policy focuses on the need for development proposals to be well related to existing settlements, close to existing public transport and maintain and enhance the vitality and viability of the economy	The proposals enhance connectivity of settlements in the region and measures are included to mitigate against community severance and effects on accessibility (see Sections 6.4 and 16.8)
32: Transport Infrastructure: Safeguarding Land and Minimising Environmental Impacts	Land identified in local plans will be safeguarded for transport proposals that contribute to the modern transport system The best practicable environmental option not entailing excessive cost will be required to mitigate the impacts of transport proposals	Proposed development enhances transport infrastructure contributing to the modern transport system. The scheme has been designed to minimise environmental impacts and mitigation would be used to ensure minimal environmental impact The options appraisal indicates that the preferred scheme was the most suitable
33: Sharing Responsibility for Transport	Policy stating that developer contributions will be required to mitigate against adverse effects of travel patterns caused by the development of existing transport infrastructure There will be a presumption against developments whose travel demands will not be satisfied by measures such as proposed car parking measures up to the maximum number for the development and non-car measures such as cycling	Development is proposed to have advantageous effects on travel patterns (see Chapter 4)

Table 5.2: Aberdeenshire Local Plan Policy Appraisal

Policy	Description	Appraisal
ENV 1	**International Nature Conservation Sites** Development that would have an adverse effect on a Natura 2000 or a Ramsar site will be refused unless the developer proves: a) there are imperative reasons of overriding national interest, including those of a social, environmental or economic nature; b) the objectives of the designation and overall integrity of the area will not be compromised; and c) there is no alternative site for the development Where development is allowed which could affect any of these designated sites, including beyond their boundaries, the developer must demonstrate that adequate measures will be taken to conserve and enhance the sites ecological, geological and geomorphological interest	The proposed scheme would not directly affect any designated sites. Implementation of measures to safeguard against pollution and to ensure there are no indirect effects on the nearby Ythan Estuary SPA, SAC and Ramsar site (see Chapter 10 for more detailed information) Information to inform an Appropriate Assessment of the impacts of the scheme is detailed in Chapters 9 and 10 Also see Structure Plan policy number 19
ENV 2	**National Nature Conservation Sites** Development that would have an adverse effect on a Site of Special Scientific Interest or a National Nature Reserve will be refused unless the developer proves: a) any significant adverse effects on the quality for which the area has been designated are clearly	The proposed scheme would not affect any designated sites (see Section 10.5.3 and 10.10)

Policy	Description	Appraisal
	outweighed by social and economic benefits of national importance; b) the objectives of the designation and overall integrity of the area will not be compromised; and c) there is no alternative site for the development Where development is allowed which could affect any of these designated sites, including beyond their boundaries, the developer must demonstrate that adequate measures will be taken to conserve and enhance the sites ecological, geological and geomorphological interest	Also see Structure Plan policy number 19
ENV 4	**Biodiversity** Development that would have an adverse effect on habitats or species protected under British or European Law, or identified as a priority in UK or Local Biodiversity Action Plans, or on other valuable habitats, will be refused unless the developer demonstrates: a) that the public benefits at a local level clearly outweigh the value of the habitat for biodiversity conservation; b) that the development will be sited and designed to minimise adverse impacts on the biodiversity of the site, including its environmental quality, ecological status and viability; and c) that there will be no further fragmentation or isolation of habitats as a result of the development Where there is evidence to suggest that a habitat or species of importance exists on the site, the developer may be required at his own expense to undertake a survey of the sites natural environment Where possible, developers should incorporate existing habitats and identify suitable opportunities for creating and restoring habitats, wildlife corridors and enhancement schemes, using best practice	The proposed scheme would not have significant effects on biodiversity (see Section 10.10) The proposal would not have a significant effect on any protected habitats or species in the area Badger, bat, otter, breeding birds and water vole surveys have been completed and appropriate mitigation for identified species would be implemented when the scheme was constructed (see Section 10.9)
ENV 5	**National Scenic Areas and Areas of Landscape Significance** Development within or adjacent to a National Scenic Area or Area of Landscape Significance will not be permitted where its scale, location or design will detract from the quality or character of the landscape, either in part or as a whole In all cases the highest standards of design, in terms of location, scale, siting, aesthetics and landscaping, will be required within National Scenic Areas (NSA) and Areas of Landscape Significance (ALS)	There are no NSAs in the proximity of the proposed scheme and there is one ALS to the east of the scheme area. The proposed road does not encroach on the ALS, although the policy also refers to development adjacent to the designation. However, except in the area south of Balmedie, the proposed road is over a kilometre from the designation boundary (see Section 11.4.2). The scheme has been designed for best fit into the landscape (see Chapter 11)
ENV 6	**Coastal Development** Development on the Developed Coast will be approved, in principle, if: a) the site has been allocated in a settlement statement in Chapter 8; OR b) it requires a coastal location, or it contributes to the social and economic well being of the particular settlement; AND c) it will not lead to the coalescence of coastal developments	The existing A90 forms the boundary of the Undeveloped Coast designation from south of the study area north to Rashierieve. The eastern half of the Balmedie Junction and the Easter Hatton Link would therefore touch on this designation. Minor intrusion into the Undeveloped Coast would be unavoidable because of the location the existing road and the effect is not considered

Policy	Description	Appraisal
	Development on the Undeveloped Coast will be refused unless: d) the social and economic benefits clearly outweigh any adverse environmental impact; e) there is no suitable alternative site for the development; AND f) it respects the character, environment and amenity of the surrounding area In all cases: g) development shall be prohibited on any parts of the coast that are identified as at risk from flooding or erosion; h) where applicable, the development must conform to policy Gen/ 4 (Infill Development) or the relevant countryside policy; i) satisfactory account must be taken by the developer of locating the proposal in an existing settlement, on brownfield land or in disused buildings; j) proposals for coastal protection works will be required to include an assessment of the implications of the works on coastal processes at the point of the works and on other parts of the coastal cell; k) an assessment will be required to evaluate the impact of development, individually or cumulatively, on natural and cultural heritage interests, and on open space and access	significant
ENV 7	**Protected and Other Open Areas in Settlements** Development that would have an adverse effect on a Protected Area or other open area will be refused unless: a) it is for an essential community facility which cannot be located elsewhere and whose public benefits clearly outweigh the value of the site to the settlements special character or amenity; and b) it would positively impact on the settlements overall special character or amenity.	The proposed scheme does not impact on any protected and other open areas in settlements (see Chapters 6 and 7)
ENV 11	**Agricultural Land** Development that would cause the permanent loss of productive agricultural land will be refused unless it has been allocated for development in the Plan or the developer demonstrates: a) its social or economic benefit clearly outweighs the agricultural value of the site; and b) there is no suitable alternative site for the development. Where the agricultural classification of the land is in question the developer must demonstrate its quality	The proposed development has adverse residual impacts (moderate or above) on 20 land interests (77%). It is predicted that viability would be compromised on one unit, Hill of Menie Farm which is not farmed by the owner at present The anticipated land take would not be seen as a national issue in the context of national planning policy (SEERAD 2005) (See Chapter 7 for further information)
ENV 16	**Water Catchment Areas** Development that would generate discharges or other impacts, which would have an adverse effect on the water quality or ecological status of water bodies including their catchment areas, will be refused, unless the development meets the criteria set out in policies Env1, Env2, Env3 and Env4 (International, National and Other Recognised Nature Conservation Sites and Biodiversity)	There are no major watercourses or water bodies in the area of the proposed development however, there are several small burns which drain eastwards into the sensitive Ythan Estuary and to the coast. Mitigation measures including Sustainable Urban Drainage Systems (SUDS), would be incorporated into the design of the development and effects would not be significant. See Chapter 9 for more detailed information
ENV 18	**Listed Buildings** All Listed Buildings or structures contained in the statutory list of Buildings of Special Architectural or	There are four nationally important listed buildings in proximity to

Policy	Description	Appraisal
	Historic Interest for Aberdeenshire shall be protected against all works which would have a detrimental effect on their listed character, integrity or setting by the refusal of listed building consent and/or planning permission The council will encourage the protection, maintenance, enhancement, active use and conservation of Listed Buildings Alterations and extensions to Listed Buildings or new developments within their curtilage must be of the highest quality, respect the original structure in terms of setting, scale, design and materials and conform to Appendix 4 In principle, the council will be sympathetic to applications, which demonstrate satisfactorily that the proposed development is essential to securing the viable use of the Listed Building without undermining its architectural or historic character or its setting Where housing is proposed as enabling development the applicant must show he has no opportunities for new housing development under policies Hou1, Hou3, Hou4, Hou5 or Hou6 on that site Any enabling housing development must comply with parts b), c) and d) of section 2 of policy Hou4 and will be a one off opportunity	the proposed scheme including Orrock House and Gatepiers, Orrock Dovecot, Menie House and Mill of Foveran. There would be a moderate adverse effect on the setting of Orrock House but this would be no worse than the preferred option from 1996 which satisfied Historic Scotland (see Annex A) For a detailed appraisal of effects see Chapter 12
ENV 19	**Archaeological Sites and Ancient Monuments** Development, which would have an adverse effect on an Ancient Monument or other archaeological site of either national or local importance or on their settings, will be refused unless: a) there are imperative reasons of overriding public interest, including those of a social, environmental or economic nature; and b) there is no alternative site for the development When development is approved, satisfactory steps must be taken to mitigate adverse development impacts, at the developer's expense Similarly, when development is approved and the reservation of the site in its original location is not possible, the excavation and recording of the site will be required in advance of development, at the developer's expense Where there is doubt, the developer may be required to provide further information on the nature and location of the archaeological feature(s) involved prior to determination of the planning application	There are several Archaeological Sites and two Scheduled Ancient Monuments (SAM), Temple Stones and Hare Cairn, in proximity to the proposed scheme There would be no direct or indirect effects on the Temple Stones SAM There would be a moderate adverse effect on the setting of Hare Cairn from the realigned B977 link road which could not be avoided For a detailed appraisal of effects on archaeological sites and ancient monuments see Chapter 12
ENV 21	**Local Cultural Sites and Vernacular Buildings** Development that would have an adverse effect on local cultural sites will be refused, unless the	The proposals are likely to have a direct physical impact on six

Policy	Description	Appraisal
	developer takes satisfactory steps to mitigate negative development impacts Development that would involve the unnecessary demolition or insensitive alteration of vernacular buildings that contribute to the character or amenity of the surrounding area will be refused	sites of local importance. Only two of the sites would be destroyed. In the remaining four sites it is likely that there would only be partial loss of the site If the archaeology is unavoidable then it would be excavated and recorded to a suitable standard. Where the site is upstanding, rather than buried archaeology, it would be recorded to a suitable standard The two sites that would be destroyed are upright stones and would be relocated to a similar location nearby rather than being entirely removed and the effects are not considered significant See Chapter 12 for more detailed information
ENV 22	**Public Access** Development that would have an adverse effect on any existing or potential public access for walking, cycling or horse riding, will be refused unless: a) it retains existing or potential public access while maintaining or enhancing its amenity value; or b) it makes alternative access provision that must be no less attractive and is safe and convenient for public use Encouragement will also be given to new access routes, which promote green transport while not adversely affecting the land concerned	The proposed scheme would retain existing or potential public access during construction and provide a safe alternative (if required) in the final design. A new link from Balmedie to Drumhead/Belhelvie Church and two new footways from South Folds and the Holdings to the underpass at Balmedie Junction would be provided Refer to Chapter 6 and 16 for further information.
INF 1	**Roads and Accesses** A new road or other access will be approved if: a) it is designed to be safe, convenient for pedestrians, cyclists and public transport, resource efficient and cause minimal impact on the character of the site and surrounding area; b) no new private access is taken directly from a road carrying more than 2,000 vehicles per day (average daily flow); c) satisfactory arrangements are made for its subsequent maintenance; and d) where required, a Transport Assessment shows that the development and any mitigation measures proposed will not have significant transport impacts on existing transport infrastructure or services	The proposed scheme has been designed to be safe for all users to obtain access and to avoid adverse effects. The new road would provide safer access than at present in accordance with the policy(see Section 2.2 and Chapters 3, 6 and 16)
INF 4B	**Additional Drainage Standards: Sustainable Urban Drainage Systems (SUDS)** Development will be approved, in principle, if surface water treatment is dealt with in a sustainable manner and in ways that avoid flooding and pollution Flood risk assessments will be required in those cases where flooding can be expected SUDS will be required as a means of achieving sustainable disposal and/or re- use/recycling of surface water In all cases the developer will be required to demonstrate how the effectiveness of the measures taken will be maintained in perpetuity	SUDS measures have been integrated into the design of the proposed development and a flood risk has been undertaken (see Chapter 9). A flood risk has been undertaken and no significant effects from the scheme on flood risk are predicted with implementation of the agreed mitigation measures
GEN 1	**Sustainability Principles** Development will be assessed against sustainability indicators that relate to the local environment, community and economy, demonstrated by whether the proposal:	The proposed scheme has been designed taking account of the sustainability principles where possible pre, during and post

Policy	Description	Appraisal
	a) is concerned with the long term sustainable use and management of land; b) is well related to existing settlements and avoids dispersed patterns of development; c) reduces the need to travel using private cars, by being close to existing public transport or allowing safe, easy access by walking and cycling; d) does not damage valuable natural resources, habitats, species or the environment; e) does not damage built or cultural heritage resources; f) does not impact negatively on the character, environment or amenity of the surrounding area; g) makes full use of design and technology to maximise the efficient use of energy and resources, and minimise light pollution; h) does not prejudice future development opportunities nor create a precedent for inappropriate future development patterns; i) reduces the production of waste and manages it as a resource in accordance with the waste hierarchy i.e. Reduce, Reuse, Recover, Dispose; j) does not give rise to hazards, pollutants, flooding or nuisances in the surrounding area; k) does not compromise public health or safety; l) provides new, or helps support existing, local employment; m)helps support existing community services and facilities; n) provides affordable access to land or housing to people in need and promotes security of tenure Where there is substantial doubt in assessing proposals, the precautionary principle will apply	construction and those that would continue to be taken into account in further development of the scheme (see Section 3.4)
GEN 5	**Landscaping Standards** Development will be approved, in principle, if the provision of landscaping and proposals for its subsequent maintenance conform to the requirements in Appendix 5.	Landscape proposals have been drawn up to mitigate the effects of the scheme (see Section 11.7 and Figures 11.7a-h: Outline Landscape Design). The planting would be maintained for the period of the contract by the contractor and subsequently by Transport Scotland's road maintenance contractor

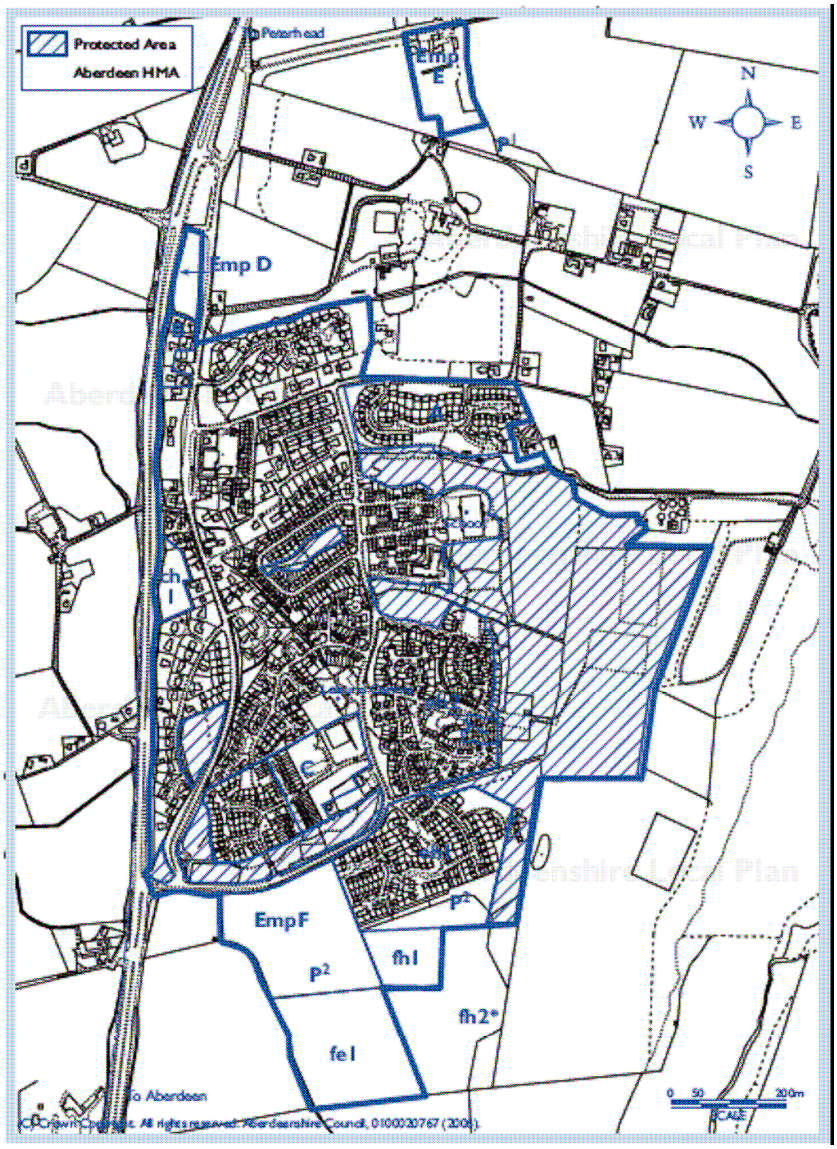
5.5.1 Balmedie to Tipperty Area

Specific proposals maps are set out in the Local Plan for areas within Aberdeenshire. Settlement maps for the scheme area (Balmedie to Tipperty) are found within the Formartine area proposals map. The maps include designations and development policies/proposals for specific settlement areas.

Some 0.93ha of land designated for employment use (EmpF) and strategic landscaping (p^2) would be lost at the south of Balmedie.

Figure 5.1, Figure 5.2 and Figure 5.3 show the specific areas within the settlements (Tipperty, Foveran and Balmedie) in the scheme area designated for development.

Figure 5.1: Areas Designated for Development within Balmedie[60]



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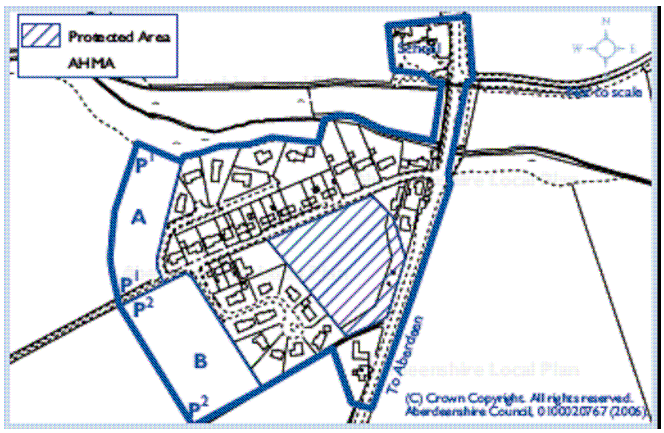
These maps were taken from Aberdeenshire Local Plan 2006 with the permission of Aberdeenshire Council

[60] Source: Aberdeenshire Council (2006) Aberdeenshire Local Plan. Aberdeenshire Council

In Balmedie there are nine main opportunities for new development:

- Site eh1 is suitable for around 104 houses
- Site eh2 is suitable for around 20 houses
- Site ch1 is suitable for around 9 houses
- Site A is suitable for around 50 houses
- Site B is suitable for around 6 houses
- Site C is suitable for appropriate community facilities
- Site Emp D is suitable for appropriate business use(s)
- Site Emp E is suitable for mixed use employment and residential (maximum of 6) in equal proportions by site area, subject to a development brief
- Site Emp F is suitable for appropriate employment use(s)
- Two project areas shown as Site P^1 (access improvements) and Site P^2 (strategic landscaping)
- Future housing land shown as Site fh1 (25) and Site fh2
- Future employment land shown as Site fe1.

Figure 5.2: Areas Designated for Development within Foveran[61]



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In Foveran there are the following opportunities for new development:

- Site A is suitable for around 6 houses
- Site B is suitable for around 12 houses
- Two project areas shown as Site P^1 and P^2 (strategic landscaping)
- First time sewerage provision will be required

[61] Aberdeenshire Council (2006) Aberdeenshire Local Plan. Aberdeenshire Council

Figure 5.3: Areas Designated for Development within Tipperty[62]

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Within Tipperty, only development meeting the Local Plan's policy will be permitted.

5.6 PLANNING PERMISSIONS

Aberdeenshire Council has confirmed that there are no recent planning approvals in the area of the proposed road. Proposals for a major golf and hotel development at the Menie Estate and a quarry at South Orrock are being progressed but neither have yet been planning permission (*pers com* Planning Department, Aberdeenshire Council, 22nd March 2007[63]).

5.7 SUMMARY

- The proposed scheme broadly complies with National Government guidance and Structure and Local Plan policies.
- Mitigation has been defined for any potentially significant impact on the environment to ensure that any residual effects are reduced to the minimum for safe implementation of the development.
- The scheme has been designed to take account of future development in Balmedie, Foveran and Tipperty. However 0.93ha of land designated for employment use and strategic landscaping would be lost south of Balmedie.
- Although the proposed scheme does not actively promote a modal shift to more sustainable modes of transport, the scheme would not lead to an increase in traffic on the road.
- The eastern half of the Balmedie Junction and the Easter Hatton Link would touch on the area designated as undeveloped coast. This is unavoidable

[62] Aberdeenshire Council (2006) Aberdeenshire Local Plan. Aberdeenshire Council
[63] We understand that the quarry application has since been rejected at Planning Committee but that an appeal may be made by the applicant and that the Menie Estate proposals are still being progressed through the planning process

because of the location of the existing road and the effects are not considered significant.

- There would be moderate adverse effects on the setting of Hare Cairn SAM and Orrock House (A Listed Building). The landscape design has sought to minimise effects but they cannot be fully avoided because of the elevated position of the sites above the new road.

6 LAND USE AND PROPERTY

6.1 INTRODUCTION

This chapter describes the land uses in proximity to the proposed site and appraises the effects on land use, footpaths and footways[64], public transport, property, community land and businesses across the scheme corridor, which could arise from development of the proposals. Key features described in the text are shown on Figures 6.1a-e. Impacts of the proposals on agricultural land and Scottish Forestry Grant Scheme (SFGS) woodlands are described in Chapter 7. SFGS resources are listed in Section 6.4.5 for reference.

6.2 SOURCES OF INFORMATION

Information for the assessment was gathered from:

- site visits by the team;
- consultations with residents in the area , local people, public utility companies and relevant organisations (see Section 1.6.3 and Annex A); and
- the 1:25 000 Ordnance Survey (OS) map, Ellon & Inverurie (Explorer 421).

6.3 CONSULTATIONS

Key issues raised by consultees included:

- the existing A90 acts as a barrier to equestrian movements as it is too dangerous to cross on horseback (British Horse Society (BHS), June 2006);
- that there are a variety of utility plants along both verges of the A90 including fibre optics and electrical cabling, gas and water pipelines (Bear Scotland, February 2006) (see Table 6.4); and that
- the proposed upgrade crosses two British Petroleum (BP) pipelines and the St Fergus Mossmoran Shell Pipeline. The ES should not include measures that conflict with the requirement for the Health and Safety at Work etc Act 1974 (Health and Safety Executive, December 2005).

6.4 BASELINE

6.4.1 Introduction

The proposals are located in the north east of Scotland, north of Aberdeen. The area is rolling farmland that falls gently, from west to east, down towards the coastline and extensive dune system of the Foveran and Menie Links and the Ythan Estuary, all of which are protected sites (see Section 10.5.3).

The key land use in the area is intensively managed farmland, a mix of arable and pasture (see Section 7.4). The field patterns dominate the area although there are few well defined hedges and field boundaries are predominantly post and wire fencing. There are, a few, scattered, and often broken hedgerows and dry stone (boulder rubble) dykes particularly in the south, where the fields tend to be smaller than in the north (see Section 11.4).

[64] A footpath is a pedestrian route remote from the road and a footway is adjacent to the road carriageway

6.4.2 Road Network

The existing A90 trunk road is part of the main transport corridor connecting Aberdeen with Peterhead and Fraserburgh. The road is dual carriageway from Aberdeen to Balmedie and again north of Tipperty. Between Balmedie and Tipperty, the road is single carriageway and has limited overtaking opportunities. Between Blackdog and Balmedie the road is dual carriageway with gaps in the central reserve to allow access to and from the adjacent communities. It becomes a single carriageway at the north side of Balmedie where the B977 from Dyce connects from the west. The B977 is a popular commuter route for people travelling to and from Dyce Airport. The road continues north through agricultural land, past the Menie Estate on the east, which is used for shooting, with scattered pockets of trees providing cover for game. The A975 runs south from Peterhead, via Newburgh, to meet the A90 opposite Rashierieve. Next the A90 runs through Foveran, a small village, over the Pitgersie Bridge and past Foveran Primary School on the west side of the road edge. Further north the B9000 runs west from Newburgh to cross the A90 at Fountainbleau. This route is used for access between Newburgh and Ellon to the north. The road sweeps round to the west to Tipperty where it becomes dual carriageway again. In addition to the main routes, there are a variety of local access routes off the existing A90 and these are summarised in Table 6.1.

Table 6.1: Local Accesses off the Existing A90

Local Access	Grid Reference
West Side of the Existing A90	
Access to Wester Hatton	NGR NJ 958 156
Access to Millden and East Aberdeenshire Golf Club[65]	**NGR NJ 963 164**
Access to South Folds	NGR NJ 963 170
Access to The Holdings	NGR NJ 963 174
Access to South Orrock	NGR NJ 966 191
Access to the Cock and Bull Public House	NGR NJ 966 192
Access to Orrock House (and Boghead)	**NGR NJ 968 197**
Access to Dambrae	**NGR NJ 968 207**
Access to Stoneyards	NGR NJ 969 209
Access to Aikenshill	NGR NJ 971 215
Access to commercial properties at Rashierieve	NGR NJ 972 223
Access to Kirkhill	**NGR NJ 973 224**
Access to Blairythan Smithy	NGR NJ 971 233
Access to Blairythan Cottage	NGR NJ 971 236
Access to Overhill (through Foveran)	**NGR NJ 973 237**
Access to Foveran Primary	NGR NJ 972 240
Access to Westfield	NGR NJ 973 243
Access to West Pitmillan and Hillhead of Kincraig	NGR NJ 975 248
Access to Fountainbleau	NGR NJ 975 258
Access to South Farden (B9000)	NGR NJ 975 259
Access to Bridgend and Tipperty	**NGR NJ 968 265**
East Side Of the Existing A90	
Access to Blackdog Rifle Ranges	NGR NJ 958 155
Access to Easter Hatton Landfill Site and properties	NGR NJ 963 160
South access to Balmedie	**NGR NJ 963 172**
North access to Balmedie	**NGR NJ 964 184**
Access to Blairton	NGR NJ 964 184
Access to Mill of Blairton	**NGR NJ 966 196**

[65] Accesses marked in bold are public roads

Local Access	Grid Reference
Access to Pettens	NGR NJ 967 198
Access to Menie Estate	NGR NJ 968 207
Access to Cothill at Delfrigs	**NGR NJ 969 211**
Access to Newtyle House	NGR NJ 973 219
Access to Newtyle Croft (A975)	NGR NJ 973 224
Access to Mains of Newtyle	**NGR NJ 973 223**
Access to Mill of Foveran	**NGR NJ 973 239**
Access to Oldmill Croft	NGR NJ973 242
Access to Pitmillan	NGR NJ 975 247
Access to Fornety	**NGR NJ 974 260**

6.4.3 Public Transport

Only 6% of travel to work trips in Aberdeenshire are by bus compared to 13% nationally[66], however this section of the A90 carries many services that link up at Ellon Park and Ride site and then travel south to Aberdeen. Seven services run along the A90 between Balmedie and Tipperty:

- X50 – a park and ride service between Aberdeen and Ellon;
- 250 - between Aberdeen and Ellon;
- 251 – between Aberdeen and Fraserburgh;
- 260/263 – between Aberdeen and Peterhead;
- 267/268 - between Aberdeen and Fraserburgh;
- 493 - between Ellon and Inverurie.

As part of the STAG study (see Section 1.4) it was found that buses could experience delays of approximately five minutes during peak times on the existing A90 between Balmedie and Tipperty because of the long platoons that form behind slow moving vehicles.

6.4.4 Pedestrian Routes, Cycleways and Bridleways

The National Catalogue of Rights of Way[67] includes two records of rights of way (GG91 and GG72) in the scheme corridor, both within the Fornety plantation (see Figure 6.1e and Section 6.4.5). There is also a footpath from the southern entrance to Balmedie (NGR NJ 964 171) linking from Old Road through the small area of shelterbelt plantation to the housing estate to the east. There are steps leading from Balmedie up to the dual carriageway opposite the Holdings. This is a remnant of the road that linked The Holdings to the old road before the existing A90 was built. Pedestrians use the route to cross the existing A90, using a gap in the central reserve and access a track that leads up to and past No. 6 The Holdings. The B977 is used as a walking route to and from Balmedie to access facilities in the village and Belhelvie Church. In both directions walkers have to cross the existing A90 using the gap in the central reserve at the north end of Balmedie. There is also some foot traffic from Newburgh to the cemetery on the A975 (see Figures 6.1a-e).

Feedback from consultees and residents in the area indicates that there is also informal recreation in the area. The plantation at Aikenshill is used for walking and horse riding and is valued by local residents[68] as a quiet amenity area. There are no official bridle paths in the study area however agricultural land and local

[66] Carl Bro, 2004 A90 Balmedie to Tipperty Corridor Study, STAG Report for the Scottish Executive. May 2004
[67] National record of public rights of way within England, Wales and Scotland, http://www.way-finder.co.uk/
[68] Email from resident to Transport Scotland, 7th February 2006

roads are used for horseriding. Movements across the existing A90 to the coast on horseback are limited due to the perceived danger in crossing the busy road (see Section 6.3).

6.4.5 Forestry

The Forestry Commission has advised that there are six areas of forestry planted under Scottish Forestry Grant Schemes (SFGS[69]) (Figure 6.1a-e):

- *Millden* (NGR NJ 958 165) – Numerous small areas of new planting within the East Aberdeenshire Golf Course.
- *Menie House Estate* (NGR NJ 969 207) – Three small areas of mixed woodlands designed to maximise game cover.
- *Dambrae* (NGR NJ 966 208) – A 4ha area planted as a native broadleaved woodland. The trees are planted in and around a designed open space to create a variety of habitats throughout the area. There are three ponds in the open section of the scheme.
- *Aikenshill* (NGR NJ 964 214) – A 33ha of new woodland, the primary objective of which is the production of quality softwood. The majority of the plantation is sitka spruce, with some lodgepole pine and Japanese larch. A small area of mixed broadleaves has been planted for amenity and landscape diversity.
- *Oldmill Croft* (NGR NJ 974 244) – A 2ha young, mixed, predominantly native broadleaved woodland for amenity and wildlife value. The outer perimeter is deer fenced.
- *Fornety* (NGR NJ 976 264) – 75.44ha commercially planted scheme for foliage and young Christmas trees with a requirement for the owner to keep the land in forestry for a minimum of 20 years. There is a strip of broadleaves immediately inside the scheme boundary adjacent to the existing A90. The scheme is deer-fenced.

Other woodlands in the area include:

- broadleaved woodland around Balmedie House and Blairton on the east side of the current A90;
- a small copse of woodland, mainly scrubby willow, to the east of Hill of Menie Croft; and
- a small area of mixed planting surrounding Kirkhill.

All areas of woodland are shown on the Phase 1 survey maps (see Figures 10.2 a-c).

6.4.6 Residential Property

There are three main villages in the scheme area as well as scattered hamlets, and settlements consisting predominantly of traditional single and one and a half storey cottages and farmsteads. Table 6.2 shows the properties within 300m of the scheme[70].

[69] The Scottish Forestry Grant Scheme is a system where by farmers are given grants by the Forestry Commission to help them change their land from agriculture to a forestry land use subject to conditions

[70] The field surveys have sought to be as accurate as possible but where there are groups of buildings properties could have been missed

Table 6.2: Residential Properties within 300m of the A90(T)

Distance from Road Edge	West of the A90(T)	*Approximate Change in Distance from Existing A90*	East of the A90(T)	*Approximate Change in Distance from Existing A90*
0 – 50m	2 (South Folds)	*1: no change* *1: **50m closer***	19 (Balmedie)	*No change*
	1 (The Holdings)	*No change*	1 (Tipperty Industrial Estate)	*No change*
	2 (Tipperty)	*No change*	---	---
50 – 100m	2 (Millden)	*No change*	1 (Hatton of Millden)	*No change*
	1 (Lauren Grove (also a cattery))	*No change*	1 (Easter Hatton)	*No change*
	3 (South Folds)	*1: no change* *2: **50m closer***	26 (Balmedie)	*No change*
	1 (The Holdings)	*No change*	---	---
	1 (Keir)	*No change*	---	---
	1 (Fountainbleau)	***50m further away***	---	---
	8 (Bridgend)	*No change*	---	---
	4 (Tipperty)	*No change*	---	---
100 - 150m	3 (Millden)	*No change*	35 (Balmedie)	*No change*
	1 (Millden Cottage)	*No change*	1 (The Bungalow)	***100m further away***
	1 (Jandel (also a cattery))	*No change*	3 (Cock & Bull)	***100m further away***
	1 (Millden Farm)	*No change*	1 (Dambrae)	***50m closer***
	1 (The Holdings)	*No change*	1 (Mill of Foveran) (derelict)	***150m closer***
	1 (Keir)	*No change*	---	---
	1 (Drumhead Lodge)	*No change*	---	---
	1 (Orrock House)	***150m closer***	---	---
	1 (Stoneyards)	***150m closer***	---	---
	1 (Blairythan Smithy)	***100m further away***	---	---
	2 (Blairythan Cottage)	***100m further away***	---	---
	3 (Foveran)	*No change*	---	---
	3 (Bridgend)	*No change*	---	---
	5 (Tipperty)	*No change*	---	---
150 – 200m	1 (Millden)	*No change*		
	1 (The Holdings)	***50m closer***	58 (Balmedie)	*No change*
	1 (Keir: including Lindens Clinic)	*No change*	1 (Hill of Menie)	***100m further away***
	1 (Orrock Mains)	***100m closer***	1 (Mill of Foveran)	***50m closer***
	1 (Hill of Menie Croft)	***100m further away***	---	---
	3 (Foveran)	*No change*	---	---
	1 (Oldmill Croft)	***150m further***	---	---

Distance from Road Edge	West of the A90(T)	*Approximate Change in Distance from Existing A90*	East of the A90(T)	*Approximate Change in Distance from Existing A90*
		away		
	2 (Bridgend)	*No change*	---	---
	5 (Tipperty)	*No change*	---	---
200 – 300m	1 (The Holdings)	*No change*	129 (Balmedie)	*No change*
	1 (Drumhead Cottage)	*No change*	4 Jaswood	***1: 100m further away*** *3: No change*
	2 (South Orrock)	***100m closer***	1 (Sidney Cottage)	***250m further away***
	1 (North of Hill of Menie Croft)	***100m closer***	2 (Hill of Menie)	***200m further away***
	1 (Wardhead)	***100m closer***	2 (Road to Aikenshill)	***100m further away***
	1 (Seven Acres)	***100m closer***	5 (Aikenshill)	*3: no change* ***2: 100m further away***
	2 (Kirkhill)	***100m closer***	1 (Aikenshill)	***100m further away***
	15 (Foveran)	*No change*	1 (Cairneylaw) (derelict)	***250m further away***
	3 (Duncan Oldyard, Ammonlea, Barndeen)	***Duncan Oldyard: 150m further away Ammonlea: 200m further away Barndeen: 250m further away***	2 (Mill of Foveran)	*No change*
	2 (South Farden)	***100m further away***	4 (Pitmillan)	***100m closer***
			2 (Fornety)	***100m closer***

6.4.7 Commercial Property

Table 6.3 lists the commercial properties found within 300m of the route. The key commercial properties in the area are (see Figures 6.1a-e):

- the timber yard at Wester Hatton;
- the Easter Hatton Landfill Site;
- the East Aberdeenshire Golf Club at Millden;
- the Victoria Garage at Drumhead;
- the Cock and Bull Public House (with licensed restaurant) north of Balmedie;
- the Bon Accord Training Centre at Hill of Menie; and
- a car dealership, a steel fabrication yard (GGD Engineering) and the Bon Accord Granite Centre at Rashierieve (see Photograph 16).

There are two catteries at Millden however these are attached to residential properties and so have been included in Table 6.2. There are also a number of scattered farms in the area of the scheme (see also Chapter 7).

Table 6.3: Commercial and other Non-Residential Properties within 300m of the A90(T).

Distance from Road Edge	West of the A90 (T)	*Approximate change in distance from Existing A90*	East of the A90 (T)	*Approximate change in distance from Existing A90*
0 – 50m	1 Building (Wester Hatton Timber Yard)	*No change*	---	---
50 – 100m	2 Buildings (Wester Hatton Timber Yard)	*No change*	Barn (Aikenshill)	***200m closer***
	---	---	Workshop & Barn (Tipperty Industrial Estate)	*No change*
100 - 150m	East Aberdeenshire Golf Club (Club House)	*No change*	3 buildings (Easter Hatton Landfill Yard)	*No change*
	Barn (Blairythan Smithy)	***150m closer***	Cock & Bull Public House	***50m further away***
	Farm Buildings (Fountainbleau)	***50m closer***	Barns (Dambrae)	***50m closer***
	---	---	Barn (Mill of Foveran)	***150m closer***
	---	---	Workshop & Barn (Tipperty Industrial Estate)	*No change*
150 – 200m	---	---	1 building (Easter Hatton Landfill Site)	
	Farm Buildings (Keir)	***150m closer***	Bon Accord Training Centre (Hill of Menie)	***50m further away***
	2 Buildings Foveran Primary School	***150m further away***	Farm Buildings (Aikenshill)	***100m closer***
200 – 300m	Balmedie Pet Crematorium (part of house at Wardhead)	***100m closer***	Barn (Rashiereive)	***150m further away***
	Livery/Stables (Seven Acres)	***100m closer***	Barns (Fornety)	***50m closer***
	Barns (South Farden)	*No change*	---	---

6.4.8 Sensitive Properties

The villages close to the scheme are Tipperty, Foveran and Balmedie. There are also a number of small hamlets associated with the A90 including Millden, Dambrae and Rashiereive. Balmedie in the south provides the main shopping and community facilities including a post office, playground, library and leisure centre. There are primary schools at Balmedie, Foveran and Tipperty with the fenced playground of Foveran Primary School located close to the western edge of the existing A90. At Drumhead hamlet there is a church and a community hall, the latter sharing its building with the car garage (see Figures 6.1a-e).

6.4.9 Development Land

There are several areas within Balmedie, Foveran and Tipperty that are designated for development in the Aberdeenshire Local Plan (see Figures 5.1-5.3 and Section 5.5).

6.4.10 Utilities

Table 6.4 summarises the public utilities located in the scheme area. The key facilities are shown on Figure 6.2.

Table 6.4: Public Utilities

Utility Provider	Plant Location
BP plc	BP's 36" pipeline crosses the A90 approximately 100m south of the start of the dual carriageway section at Tipperty
BP LPG UK	A small number of properties within the area (approximately 15-20) are served by LPG gas pipework
British Telecom	A major underground cable system follows the A90, from Balmedie to Tipperty. The cable is generally located within the west verge but crosses the existing road at numerous locations to serve the scattered properties. It is unknown if the plant is copper wire or fibre optic at this stage
Cable & Wireless	There is no Cable and Wireless plant within the study area
Orange	There is no Orange plant within the study area
Scottish and Southern Energy	The main power distribution within the area is 11kV overhead lines with local low voltage spurs serving various properties A fibre optic cable also runs past Balmedie along the line of the A90 in the western verge before crossing into the southern verge of the A975 heading towards Newburgh
Scottish Water	Water mains exist in the area although a number of properties still have private water supplies in the form of boreholes and wells A 100mm PVC distribution main runs along the west verge of the existing A90 from South Orrock to Delfrigs. From this distribution main a spur diverts along the unclassified road past Dambrae and Seven Acres A 100mm PVC distribution main runs through Aikenshill farm parallel with an existing track until it crosses the existing A90. It travels along the A90 in the eastern verge until it reaches the Mains of Newtyle access where it travels eastwards and continues to its termination at Montammo A 12" asbestos concrete trunk main approaches from the south west passing to the west of Foveran. This main runs parallel to the A90 until West Pitmillan where it turns westwards and head round the west side of Tipperty Within the village of Foveran there are three distribution mains running along Blairythan Terrace: one 150mm PVC and two 100mm PVC pipes. The 150mm PVC main travels down Blairythan Terrace before heading northwards along the eastern verge of the existing A90 towards Foveran School before crossing the road towards the Mill of Foveran. Here the pipe increases to a 200mm PVC which continues within the northern verge eastwards towards Linnhead. One of the 100mm PVC pipes terminates at the end of Blairythan Terrace in a fire hydrant whilst the other crosses the A90 before outfalling to the Foveran Burn
Shell UK Ltd	Shell 20" pipeline crosses the A90 approximately 500m south of the start of the dual carriageway section at Tipperty
Telewest Communications Plc	There is no Telewest Communications plant within the study area
Thus	An existing Thus duct runs within the verge of the existing A90. The duct runs within the western verge between Balmedie and Rashierieve before crossing to the eastern side and continuing to Tipperty
Transco	A medium pressure gas main exists throughout the area of interest and in general follows the line of the existing A90. A 180mm polyethylene (PE) medium pressure main weaves its way along the route of the A90 alternating between east and west verges The main diverts from the A90 past Foveran. The main veers slightly east of the existing road past Foveran School Road and rejoins the A90 approximately 350m north of Foveran School. Within Foveran village a low pressure main runs along Blairythan Terrace with two spurs into the village

Utility Provider	Plant Location
	The medium pressure main crosses the A90 at Pitmillan and follows the line of the 'old' A90 past Fountainbleau before crossing the B9000 (west) and heading up the Tarty Road. The 180mm medium pressure main is joined at Fountainbleau with a 125mm PE medium pressure running along the B9000 (east) from Newburgh

6.5 ASSESSMENT METHODOLOGY

To assess the overall significance of the potential effects of the proposed scheme on land use and property an assessment has been made of the sensitivity of the resource to impact and magnitude of potential impacts (see Section 1.6.4).

The assessment of land use effects has considered:

- current land uses within the scheme corridor;
- surrounding land uses in the corridor;
- the implications of the loss of land for development; and
- the compatibility of the new landuse with existing land uses.

Both the magnitude of the effects and the sensitivity of the land uses and properties have been assessed qualitatively. The assessment of the magnitude of impact is based upon the anticipated land-take and the distance of the property from the scheme. Issues such as severance, access to and from properties and changes in use of the land are also identified and considered in the magnitude assessment (see also Section 16.5). The assessments of sensitivity are based on the quality and use of the land affected, and the type of property affected e.g. residential, commercial and community. The assessment of magnitude and sensitivity has been based upon indicative criteria and professional judgement.

Table 6.5: Sensitivity of Receptor

Sensitivity	Characteristics and Examples
High	• Residential property • Land attached to a residential property • Property or land used by the community e.g. schools, community hall etc • Land attached to a community property • Core path, long distance path and National cycle route
Medium	• Other footpaths, bridleways, cycleways • Land designated for development
Low	• Commercial property • Land attached to commercial property • Utilities

Table 6.6: Magnitude of Impact

Magnitude of Impact	Impact Description (one or more criteria)
High	• Demolition of property • Significant land take from property
Medium	• Moderate land take from property
Low	• Minor land take from property
Negligible	• Negligible change to any of the above factors.

Professional judgement and awareness of the relative balance of importance between sensitivity and magnitude allows the overall significance of impact to be

assessed in accordance with the general approach and methods adopted in this document and the following table.

Table 6.7: Significance of Effect

Magnitude	Sensitivity		
	High	**Medium**	**Low**
High	Major	Moderate/Major	Moderate
Medium	Moderate/Major	Moderate	Minor/Moderate
Low	Minor/Moderate	Minor	Negligible/Minor
Negligible	Minor	Negligible/Minor	Negligible

The table provides a guide as to the significance of impact, although it should be noted that professional judgement is used to determine the final significance category. The significance of impact is assessed with mitigation to define residual effects.

Impacts on agricultural land use interests are discussed in Chapter 7.

6.6 POTENTIAL IMPACTS

6.6.1 Permanent

Potential permanent impacts include:

- direct and indirect impacts to properties including demolition, interruption of access etc;
- loss of garden from three houses at South Folds and No.6 at The Holdings;
- a loss of some 0.93ha of land designated for residential development around Balmedie;
- loss of the driving range from East Aberdeenshire Golf Club;
- interruption to pedestrian routes, cycleways and bridleways;
- direct and indirect impacts to current land uses;
- permanent loss of land to the proposals;
- incompatibility of new land uses with existing land uses; and
- impacts to utilities in the area.

6.6.2 Construction

Potential construction impacts include:

- conflicts between construction activities and users of the existing A90;
- interruption to existing land uses and agricultural activities by ongoing construction activities;
- increased hazards to users of the area from construction activities; and
- interruptions to services through interference with utilities.

6.6.3 Operational

Potential operational impacts include:

- improved travelling time and driver safety; and
- interference with current activities because of changed traffic patterns.

6.6.4 Mitigation Measures

LU1. All redundant areas of road following construction of the new road would be grubbed up unless consultation with the landowner identifies these should be left for other purposes.
LU2. The accesses to South Folds would be designed to reinstate suitable garden boundaries where these are affected. A detailed design study would be developed in consultation with the affected landowners.
LU3. To minimise the impact on No.6 The Holdings, the road cutting would be formed as a retaining wall, which would be continued up to form a new garden wall with some noise reducing value. Detailed mitigation would be agreed with the landowner.
LU4. Mitigation for the loss of the driving range would be agreed with East Aberdeenshire Golf Club if the proposals are consented.
LU5. Access to all properties would be maintained through provision of underpasses or bridges over the new road where required and by provision of new links.
LU6. Compensation would be provided to the landowner for the two ponds lost at Dambrae.
LU7. A new footpath would be provided between Balmedie and Drumhead via the Keir underpass.
LU8. Footways would be provided linking the Holdings and Millden to Balmedie via the Balmedie Junction (see Figure 6.1a).
LU9. The footpath linking the southern entrance to Balmedie with the housing estate to the east would be reinstated where it is affected by the works on Old Road.
LU10. The steps from Balmedie up to the carriageway opposite the Holdings would be closed up to discourage pedestrians crossing at this point.
LU11. All residents and businesses in proximity to the works would be informed about the details of the final proposals and the construction timetable in advance of construction beginning.
LU12. The land take for the proposals would be kept to the minimum necessary for safe construction and mitigation of the works, particularly where in Prime Agricultural Land.
LU13. All utilities which would be affected by construction would be protected to ensure that the supplies of water, electricity, telephone etc to properties would be maintained. If any short interruptions were required to join in new connections to the site affected parties would be notified in advance.
LU14. All pipelines would be protected during construction from any potentially damaging activities.
LU15. Any field drains affected by construction would be reinstated.

6.7 ASSESSMENT OF RESIDUAL EFFECTS

6.7.1 Permanent

The construction of the scheme would result in a change of landuse of 150.18[71] ha. This total includes construction of earthworks, new roads and bridge structures, road drainage (including filter trenches, and detention ponds) and land for essential mitigation, principally new landscaping (Section 11.7). No property demolitions would be required for construction of the scheme.

[71] All landtake figures in the ES are approximate as exact figures would depend on the details of the final design

There would be a loss of 0.12ha from three properties at South Folds and 0.021ha from the garden at No.6, The Holdings. This landtake would be required to allow slip roads to be built on and off the A90 at the new junction at Balmedie. The effect is assessed as major adverse because it is loss of land from individual residential properties. The property boundaries would be reinstated in discussion with each landowner.

The closure of the central reserve at Millden requiring traffic to access Millden and the East Aberdeenshire Golf Club from the new Balmedie Junction would result in a moderate adverse effect at the golf club from the loss of the driving range from the facilities it currently provides. Specific mitigation for the loss would be worked up with the owner if the scheme is consented and would include a new access to the golf club carpark[72]. Severance effects at the golf club are considered in Section 16.8.3.

No other significant permanent effects from the scheme on land use and property have been identified.

Some 0.93ha of land designated for employment development would be lost at Balmedie south. Approximately 18ha of land is designated for employment and future employment in this area and because the improved access facilities provided by the proposals would benefit any new development this is not considered to be significant.

All existing accesses and central reserve gaps on to the existing A90 dual carriageway would be closed between Millden and Tipperty (see Section 3.2.2.2). Alternative accesses onto the A90 and the A90(T) would be provided for affected properties. These are listed in Table 6.8.

Access to Balmedie for traffic and pedestrians would become easier and safer due to the provision of a grade separated junction south of the village and from the provision of a footway to Drumhead and Belhelvie Church, via the Keir Farm Underpass. Two other new footways would be provided that would also improve pedestrian access to Balmedie. These are:

- from the link from the Holdings on to the B977 link and down through the underpass (on one side only); and
- from the link from East Aberdeenshire Golf Club to the roundabout (on one side only) and then to join with the path from the Holdings.

The steps leading up to the carriageway from Balmedie would be closed up as the gap in the central reserve would be closed, making the crossing less safe for pedestrians at this point. Access to Foveran School would be made safer as there would be greatly reduced traffic on the existing A90, which it opens directly on to and the access road from the Mill of Foveran would be staggered so as not to open directly opposite the entrance to the school, but 50m north (see Photograph 18).

The new road would intrude on the new planting at Dambrae and Aikenshill used for informal recreation (see Section 6.4.4). These woodlands are immature and are not considered to be of as significant value to recreation as more mature

[72] Preliminary discussions have been held with the owner

woodland. The effects cannot be fully mitigated although the proposals allow for better recreational access to a wider area through reduction in traffic on the existing A90. Pedestrian, cyclist and equestrian access from properties on the west side of the scheme to the coast would be improved as new access roads and junctions would also provide safe routes across the A90(T).

Table 6.8: Accesses Provided to the Existing A90

Local Access	Grid Reference	Access Provided
West Side of the Existing A90		
Access to Wester Hatton	NGR NJ 958 156	Via the Millden Link road
Access to Millden and East Aberdeenshire Golf Club[73]	**NGR NJ 963 164**	**Via the Millden Link road**
Access to South Folds	NGR NJ 963 170	Via Balmedie south junction
Access to The Holdings	NGR NJ 963 174	Via Balmedie south junction
Access to South Orrock	NGR NJ 966 191	Via the South Orrock underpass
Access to the Cock and Bull Public House	NGR NJ 966 192	Via existing access
Access to Orrock House (and Boghead)	**NGR NJ 968 197**	**Via the South Orrock underpass, or via the overbridge at Boghead. (Boghead will access using this overbridge)**
Access to Dambrae	**NGR NJ 968 207**	**Via the Dambrae underpass**
Access to Stoneyards	NGR NJ 969 209	Via the Dambrae underpass
Access to Aikenshill	NGR NJ 971 215	Via existing access road
Access to commercial properties at Rashierieve	NGR NJ 972 223	Via existing access
Access to Kirkhill	**NGR NJ 973 224**	**Via A975 Newburgh Junction underpass**
Access to Blairythan Smithy	NGR NJ 971 233	Via existing access
Access to Blairythan Cottage	NGR NJ 971 236	Via existing access
Access to Overhill (through Foveran)	**NGR NJ 973 237**	**Via existing access road**
Access to Foveran Primary	NGR NJ 972 240	Via existing access
Access to Westfield	NGR NJ 973 243	Via existing access road
Access to West Pitmillan and Hillhead of Kincraig	NGR NJ 975 248	Via existing access road
Access to Fountainbleau	NGR NJ 975 258	Via link road into the B9000 junction
Access to South Farden (B9000)	NGR NJ 975 259	Via link road into the B9000 junction
Access to Bridgend and Tipperty	**NGR NJ 968 265**	**Via link road into the B9000 junction**
East Side Of the Existing A90		
Access to Blackdog Rifle Ranges	NGR NJ 958 155	Via existing access road
Access to Easter Hatton Landfill Site and properties	NGR NJ 963 160	Via Easter Hatton Link Road
South access to Balmedie	**NGR NJ 963 172**	**Via Balmedie south junction**
North access to Balmedie	**NGR NJ 964 184**	**Via Balmedie south junction and along the old road past 'The Bungalow'**
Access to Blairton	NGR NJ 964 184	Via existing access road
Access to Mill of Blairton	**NGR NJ 966 196**	**Via existing access road**
Access to Pettens	NGR NJ 967 198	Via existing access road
Access to Menie Estate	NGR NJ 968 207	Via existing access road
Access to Cothill at Delfrigs	**NGR NJ 969 211**	**Via existing access road**
Access to Newtyle House	NGR NJ 973 219	Via existing access road
Access to Newtyle Croft (A975)	NGR NJ 973 224	Via existing access road
Access to Mains of Newtyle	**NGR NJ 973 223**	**Via existing access road**
Access to Mill of Foveran	**NGR NJ 973 239**	**Via Mill of Foveran overbridge**
Access to Oldmill Croft	NGR NJ973 242	Via existing access
Access to Pitmillan	NGR NJ 975 247	Via Pitmillan overbridge
Access to Fornety	**NGR NJ 974 260**	**Via underpass at B9000 junction**

[73] Accesses marked in bold are public roads

Landtake would be mainly from agricultural land. Where appropriate embankments would be designed at a slope of 1:10 to enable the land to return to agriculture[74]. Impacts to agriculture are assessed in Section 7.8. Landowners would be financially compensated for permanent land loss. No community land in Balmedie, Foveran and Tipperty would be lost as a result of the proposals.

The scheme would result in the permanent loss of some areas of Scottish Forestry Grant Scheme (SFGS) woodland and ponds (Section 6.4.5). The significance of effect on forestry is considered in Section 7.8. A small copse of woodland, mainly scrubby willow would be lost to the east of Hill of Menie Croft. This is not considered significant as 11.82ha of new woodland and shrub planting would be established along the new route. The ecological and landscape significance of the change in land use are considered in Sections 10.10 and 11.8 respectively.

6.7.2 Construction

Access to all properties would remain open during construction and farm access for the movement of stock would be maintained (see Section 7.8).

The contractor would be required to maintain traffic flow on the existing A90, using traffic management where appropriate. Information on construction activities and timing would be provided to residents and those passing through the area before and during construction. Road signs directing pedestrians, cyclists and equestrians would be used where appropriate to ensure safety at all times. There would be some disruption to users of the East Aberdeenshire Golf Club during construction however access between the club house and the course would be maintained throughout construction and the effects are not considered to be significant.

If any short interruptions in utilities were required during construction all residents, businesses and community facilities would be notified in advance. The two BP pipelines and the Shell pipeline would be protected from any potential impact during construction.

Where the disruption would affect local residents they would be informed prior to construction and all services would be reinstated as soon as possible.

There would be some disruption to local residents during construction (see also Chapters 16 and 17) but with implementation of all committed mitigation effects would be minor for most of the construction period (see also Section 7.8.2).

6.7.3 Operational

The design of the A90(T) seeks to ensure that impacts to existing land uses would not be significant during operation of the scheme by ensuring access is maintained and in some cases improved (for example, access by horse riders to the coast and pedestrians walking between Balmedie and Drumhead and Belhelvie Church). The Millden Link Road re-routes traffic past the East Aberdeenshire Golf Club's clubhouse and the increase traffic passing could interfere with golfers access to the course. However the volume of traffic on the road is low and so this is not considered to be significant. Maintenance activities

[74] The scheme design has sought to balance out mitigation requirements and in some locations bunds and steeper slopes are needed to provide visual screening or noise mitigation

would be mainly within the road corridor and are unlikely to affect residents and businesses in any significant way.

6.8 SUMMARY

- The construction of the scheme would result in a change of landuse of 150.18 ha[75].
- There are some 424 properties within 300m of the scheme of which some 398 are residential and 26 are commercial.
- No property demolitions would be required for construction of the scheme. Some 0.021ha of land from the garden of No 6 The Holdings, and some 0.12ha from the gardens of three properties at South Folds would be lost. These effects are considered to be major adverse.
- There would be a moderate adverse effect at East Aberdeenshire Golf Club where the driving range would be lost to facilitate construction of a new link to the Balmedie Junction.
- Other effects of the proposals would not be significant in terms of land use change.
- Access to all properties would be maintained during construction and operation of the scheme.
- Access across the scheme corridor would be improved by the provision of safe crossing points of the A90(T) and from reduced traffic on the existing A90.

[75] All landtake figures in the ES are approximate as exact figures would depend on the details of the final design

7 AGRICULTURE, FORESTRY AND SPORTING INTERESTS

7.1 INTRODUCTION

This chapter addresses the potential effects of the proposed scheme on existing and future land use in respect of agriculture, forestry and sporting activity for the proposed A90 Balmedie to Tipperty scheme. Effects on other land uses and property have been addressed in Chapter 6 (Land Use and Property).

For the purposes of this assessment, agriculture is considered to be the practice of cultivating the land and rearing stock to produce food products. Forestry is defined in relation to the rearing of trees to produce wood and wood products. Sporting interests include shooting and stalking activities over agricultural land, forestry and water and fishing activities upon lochs, reservoirs, rivers, burns, canals and ponds.

The agricultural activities in the study area potentially affected by the proposed scheme are diverse. The capability of land to support different types of agricultural systems, from intensive arable cropping to more extensive pasture based systems, is determined by a range of physical factors such as relief and topography, climate (rainfall and growing season) and soil characteristics. Land is classed by the Macaulay Land Use Research Institute (MLURI) according to its land capability, reflecting the above conditions (see Appendix 7.1 for descriptions of land capability classes).

In addition to their main farming activities, farmers are developing, particularly in more recent years, complementary activities to generate more diverse income streams for the farming business. These include novel crop and livestock systems, provision of tourist accommodation, leisure and recreation pursuits, value-added products and contracting (labour and machinery).

The agricultural assessment within this chapter:

- describes the agriculture, forestry and sporting activity in the route corridor;
- outlines the potential impacts on agriculture, forestry and sporting activities during construction and operation of the proposed scheme;
- describes mitigation measures; and
- identifies residual effects as well as potential aggregate residual effects.

7.2 SOURCES OF INFORMATION

The assessment has drawn upon information contained in previous Stage 2[76] and Stage 3[77] assessments for the A90 Balmedie to Tipperty and reports completed by Macaulay Land Use Research Institute on soils and land capability for agriculture. Consultations relevant to this chapter were undertaken with Scottish Executive Environment and Rural Affairs Department (SEERAD) and Forestry Commission Scotland (see Annex A). This information has been supplemented with information gained through landowner consultations undertaken by Grontmij and SAC.

[76] The Scottish Office Development Department. A92: Balmedie to Tipperty, Stage 2 Environmental Assessment, December 1995. Carl Bro Group & Turnbull Jeffrey Partnership

[77] The Scottish Office Development Department. A92: Balmedie to Tipperty, Stage 3 Environmental Assessment, Volumes 1 & 2, December 1995. Carl Bro Group & Turnbull Jeffrey Partnership

7.3 CONSULTATIONS

Issues raised by consultees include:

- the anticipated land take would not be seen as a national issue in the context of national planning policy (SEERAD 2005); and
- there are several areas subject to Forestry Commission grant aid (Forestry Commission, 2006).

7.4 BASELINE

7.4.1 General Agricultural Context

The land use within the study corridor is varied in nature but is predominantly agricultural land with limited areas of woodland and scattered residential areas (see Chapter 6). Agricultural, forestry and sporting land use details are presented in Figures 7.1a-e.

The Aberdeenshire Council area covers in excess of 500,000 hectares (ha) of agricultural land equivalent to 8% of the Scottish agricultural land area. Land quality characteristics within the region vary considerably (see Section 7.4.2). There is some prime quality (LCA Class 3_1) arable land although the majority of the land is of more marginal quality (LCA Class 3_2). Hence the proportion of arable crops grown is relatively small with approximately one-third of the land area being classed as arable (in crop or in rotational grassland). Where cereal crops are grown, these are predominantly spring sown. Grass is by far the most important crop in the region with two-thirds of the total land area in temporary grass, permanent grass or rough grazing[78].

Cattle and sheep, dairy and mixed farms predominate with both crop and livestock farms having a relatively small average farm size when compared to the Scottish average. With good quality grassland common, the beef and sheep sectors are important both in the region and in a Scottish context. However, agriculture in the Aberdeen area, like other parts of Scotland, is changing and a decline in the livestock sector (particularly dairy and sheep) is evident as systems become less intensive.

7.4.2 Land Capability in Scheme Corridor

Macaulay Land Capability for Agriculture data were used to indicate the land class along the proposed scheme. This classification system gives an indication of the capability of the land to grow certain types of crops and grass. The full classification can be found in Appendix 7.1. Land is classified into seven main classes, some of which have subdivisions. Class 1 is the best quality land and Class 7 is the poorest quality land. Classes 1, 2 and 3_1 are known as prime quality land. Classes 3_2 to 7 are known as non-prime land.

The majority of the land within the study area is of Land Capability Class 3_2 (moderate range of crops of average production levels). However, there are significant pockets of prime quality land of Class 3_1. No prime land of Class 1 or 2 has been identified.

At the very southern end of the proposed scheme (Balmedie Junction, see Figure 7.1a) the Land Capability Class is 3_2. This includes land affected by the

[78] SEERAD June Agricultural Census, 2006

proposed B977 realignment. As the proposed route passes Drumhead Lodge (ch700) this improves to Class 3_1 before reverting to Class 3_2 for a small section between ch1450 and ch1600. The land capability then returns to Class 3_1 until Hill of Menie (ch2200). Small pockets of Class 3_1 land can be found around Dambrae. The land capability from this point through to Tipperty is Class 3_2 with one isolated pocket of Class 3_1 at Foveran (ch6250 to ch6300).

Table 7.1: Land Capability in the Scheme Corridor

Land Capability	Main Alignment		B977 Realignment	
	Length	Percentage		
Class 1	0m	0%	0m	0%
Class 2	0m	0%	0m	0%
Class 3_1	1555m	17%	0m	0%
Class 3_2	5990m	67%	1815m	94%
Class 4	0m	0%	0m	0%
Class 5	0m	0%	0m	0%
Class 6	0m	0%	0m	0%
Class 7	0m	0%	0m	0%
Woodland	715m	8%	0m	0%
Other (roads etc)	740m	8%	65m	6%
Total	9000m	100%		100%

The figures in the table above include areas of young woodland at Dambrae and Fornety. This land could easily be reverted to agriculture, hence it has been given a land capability class. Figures 7.1a to 7.1e show the indicative land capability for each field affected by the proposed development.

7.4.3 Scope of Agriculture, Forestry and Sporting Interests

A total of 28 agriculture, forestry and sporting land interests[79] have been identified in the scheme. The total combined area of the land interests affected by the proposal is estimated at some 1,994ha.

7.4.3.1 Agriculture

The range of agricultural activity varies from intensive livestock and arable farming systems to more extensive cattle and sheep systems. The type of activity and the level of intensity are determined by a number of factors including the land capability. At the southern end of the scheme the land supports crop and livestock farming of moderate intensity. As the proposed route approaches Dambrae (Figure 7.1c), there is a cluster of smaller units, used predominantly for equestrian purposes. The proposed route then passes through more crop and livestock units of moderate intensity until it reaches Pitmillan Farm (Figure 7.1e and Photograph 21). This is a diverse agricultural unit supporting a large breeding herd of pigs, finishing cattle[80] and arable cropping. The proposed route then passes through another crop and livestock farm before reaching Fornety (Figure 7.1d) where there is a large commercial Christmas tree enterprise (see Section 6.4.5). Crop and livestock systems then end the route at Tipperty.

7.4.3.2 Forestry

Compartments of commercial forestry, farm woodland and amenity woodland are located within the study corridor of the proposed scheme (see Section 6.4.5 and

[79] Land owners and users directly affected by the proposed route
[80] Cattle reared and sold for meat

10.5). Commercial woodland can be found at Fornety (Figure 7.1e and Photograph 24) (see Section 7.4.2). This woodland is used to produce Christmas trees and is subject to Woodland Grant Scheme[81] conditions. Further commercial woodland can be found at Aikenshill with amenity woodland at Oldmill Croft and Dambrae. These three areas are also subject to Woodland Grant Scheme conditions (see Section 6.4.5). Established farm woodlands but not subject to grant include those at The Firs, Stoneyards and South Orrock. These provide shelter for livestock.

7.4.3.3 Sporting

There is no known commercial shooting within the study corridor. However, the area does support rough shooting.

7.4.4 Sensitivity Assessment

The baseline data collected during the survey were used to give an individual sensitivity assessment for each land interest affected by the project. The sensitivity assessments for each land interest are presented in Table 7.2.

Table 7.2: Agricultural Sensitivity Assessments

Land Interest	Farm Type	Scope of Agricultural, Forestry and Sporting Activity	Sensitivity
Easter Hatton Landfill Site Land Ref 46 Figure 7.1a	Let out	Total area estimated at 52ha (agricultural land and land fill). Agricultural land in grass and arable cropping and let out on an annual basis. LCA Class 3_2 land. No known commercial sporting activity. No known environmental agreements	Medium
Land near Blackdog Land Ref 47 Figure 7.1a	Let out	Total area estimated at 63ha. Land in grass and arable cropping and let out on an annual basis. LCA Class 3_2 land. No known commercial sporting activity. No known environmental agreements	Medium
Balmedie Junction East Land Ref 44 Figure 7.1a	Unknown	Unknown land area and agricultural activity. Estimated for purposes of this assessment as 32ha with agricultural activity of moderate intensity. LCA Class 3_2 land. No known commercial sporting activity. No known environmental agreements	Low
Southfolds Farm Land Ref 37 Figure 7.1a	Crop and livestock	Total farm area approximately 24ha. Land in grass and arable cropping. LCA Class 3_2 land. Supports cereal enterprise and commercial livestock. No woodland. No known commercial sporting activity. No known environmental agreements	Medium
Keir Farm Land Ref 38 Figure 7.1b	Crop and livestock	Total farm area approximately 69ha. Land in grass and arable cropping. LCA Class 3_2 land. Supports cereals and commercial livestock (sheep and cattle). No woodland. No known commercial sporting activity. No known environmental agreements	Medium
Millden House East Land Ref 39 Figure 7.1b	No agricultural use	Total farm area approximately 2ha. Land in grass but no agricultural use. LCA Class 3_2 land. No woodland. No known commercial sporting activity. No known environmental agreements	Low
Balmedie Farm Land Ref 43 Figure 7.1b	Unknown	Unknown land area. Estimated for purposes of this assessment as 52ha with agricultural activity of moderate intensity. LCA Class 3_2 land. Farm	Medium

[81] Financial assistance from the Forestry Commission for the creation and management of farm woodlands

Land Interest	Farm Type	Scope of Agricultural, Forestry and Sporting Activity	Sensitivity
		shelter-belt. No known commercial sporting activity. No known environmental agreements	
South Orrock Land Ref 22 Figure 7.1b	Let out	Total farm area approximately 85ha. Land in grass and arable cropping. LCA Class 3_1 and 3_2 land. Farm shelterbelt. No known commercial sporting activity. No known environmental agreements	Medium
Blairton Land Ref 23 Figure 7.1b	Crop and livestock	Total farm area approximately 146ha. Land in grass and arable cropping. LCA Class 3_2 land. No woodland. No known commercial sporting activity. No known environmental agreements	Medium
Boghead Land Ref 18 Figure 7.1c	Crop, livestock and horses	Total farm area approximately 121ha. Land in grass and arable cropping. LCA Class 3_1 land. Supports cereals and commercial livestock. No woodland. No known commercial sporting interests. Participant in Land Management Contract Menu Scheme[82]	Medium
Pettens Land Ref 19 Figure 7.1c	Crop, cattle and sheep	Total farm area approximately 89ha. Land in grass and arable cropping. LCA Class 3_1 land. Supports cereals and commercial livestock. No woodland. No known commercial sporting interests. No known environmental agreements	Medium
The Firs Land Ref 17 Figure 7.1c	Let out	Total farm area approximately 6ha. Land in grass. LCA Class 3_2 land. Land let out for grazing. Farm shelterbelt. No known commercial sporting interests. No known environmental agreements	Medium
Hill of Menie Croft Land Ref 30 Figure 7.1c	Equestrian	Total farm area approximately 2ha. Land in grass. LCA Class 3_1 land. Supports equestrian activity. No woodland. No known commercial sporting interests. No known environmental agreements	High
Seven Acres Land Ref 29 Figure 7.1c	Equestrian	Total farm area approximately 12ha. Land in grass. LCA Class 3_1 and 3_2 land. Supports equestrian activity. No woodland. No known commercial sporting interests. No known environmental agreements	High
Hill of Menie Farm Land Ref 45 Figure 7.1c	Woodland	Total area less than 1ha. Amenity woodland. No know commercial sporting interests. No known environmental agreements	Low
Dambrae Land Ref 15 Figure 7.1c	Woodland	Total farm area approximately 9ha. Land in amenity woodland and grass. Three ponds have recently been created. LCA Class 3_1 land. No known commercial sporting interests. Woodland subject to woodland grant scheme conditions. No other known environmental agreements	Low
Stoneyards Land Ref 28 Figure 7.1c	Equestrian	Total farm area approximately 14ha. Land in grass. LCA Class 3_2 land. Supports equestrian activity. Farm shelterbelt. No known commercial sporting interests. No known environmental agreements	High
Aikenshill Land Ref 14 Figure 7.1d	Crop, livestock and woodland	Total farm area approximately 116ha. Land in grass, arable cropping and woodland. LCA Class 3_2 land. Supports cereals and commercial livestock. Commercial woodland subject to Woodland Grant Scheme conditions. No other	Medium

[82] The Land Management Contract Menu Scheme was introduced for the first time in 2005 (under EC Regulation 1257/1999 as amended by Regulation 1783/2003), alongside the new Single Farm Payment. It is implemented in Scotland by the Land Management Contracts (Menu Scheme) (Scotland) Amendment Regulations 2006

Land Interest	Farm Type	Scope of Agricultural, Forestry and Sporting Activity	Sensitivity
		known environmental agreements. No known commercial sporting interests	
Overhill and Kirkhill Farm Land Ref 13 Figure 7.1d	Crop and Livestock	Total farm area approximately 241ha. Land in grass and arable cropping. LCA Class 3_2 land. Supports cereals and commercial livestock. Non-commercial equestrian activity. No woodland. No known commercial sporting interests. Participant in Rural Stewardship Scheme[83]	Medium
Pitgersie Land Ref 12 Figure 7.1d	Crop and livestock	Total farm area approximately 256ha. Land in grass and arable cropping. LCA Class 3_2 land. Supports dairy and cereal enterprises. No woodland. Participant in Rural Stewardship Scheme and Land Management Contract Menu Scheme. No known commercial sporting interests	High
Mill of Foveran Land Ref 9 Figure 7.1d	Let out	Total farm area approximately 10ha. Land in grass. LCA Class 3_1 and 3_2 land. Land let out for grazing. No woodland. No known commercial sporting interests. No know environmental agreements	Medium
Oldmill Croft Land Ref 8 Figure 7.1e	Woodland and grass	Total farm area approximately 3ha. Land in grass and woodland. LCA Class 3_2 land. No commercial agricultural activity. Amenity woodland subject to Woodland Grant Scheme conditions. No other known environmental agreements. No known commercial sporting interests	Low
Linnhead Farm Land Ref 10 Figure 7.1e	Arable	Total farm area approximately 85ha. Land in arable cropping. LCA Class 3_2 land. Supports cereal production. No woodland. No known commercial sporting interests. No known environmental agreements	Medium
Pitmillan, Mains of Newtyle and Fountainbleau Land Ref 7 Figure 7.1e	Pigs, cattle and crop	Total farm area approximately 93ha. Land in grass and arable cropping. LCA Class 3_2 land. Supports cereals and commercial livestock (pig breeding herd and cattle). No woodland. No known commercial sporting interests. Subject to Nitrate Vulnerable Zone[84] conditions. No other known environmental agreements	High
Meikle Haddo Land Ref 5 Figure 7.1e	Crop and livestock	Total farm area approximately 135ha. Land in grass and arable cropping. LCA Class 3_2 land. Supports cereals and commercial livestock. No woodland. No known commercial sporting interests. Participant in Land Management Contract Menu Scheme and subject to Nitrate Vulnerable Zone conditions. No other known environmental agreements	Medium
Little Haddo Land Ref 4 Figure 7.1e	Crop and livestock	Total farm area approximately 120ha. Land in grass and arable cropping. LCA Class 3_2 land. Supports cereals and commercial livestock. No woodland. No known commercial sporting interests. No known environmental agreements	Medium
Fornety Land Ref 2	Commercial woodland	Total farm area approximately 76ha. Land in commercial woodland. LCA Class 3_2 land.	High

[83] The Rural Stewardship Scheme (RSS) is an Agri-environment Scheme designed to encourage farmers, crofters and Common Grazings committees to adopt environmentally friendly practices and to maintain and enhance particular habitats and landscape features. It is legislated under Council Regulation (EC) 1257/1999, Commission Regulations (EC) 445/2002, 963/2003 and in Scotland, The Rural Stewardship Scheme (Scotland) Regulations 2001, as amended on 30th June 2003

[84] An area designated under the EC Nitrates Directive 91/676/EEC implemented in Scotland by the Designation of Nitrate Vulnerable Zones (Scotland) Regulations 2002

Land Interest	Farm Type	Scope of Agricultural, Forestry and Sporting Activity	Sensitivity
Figure 7.1e		Supports Christmas Tree enterprise and other commercial woodland. Subject to Woodland Grant Scheme conditions. No other known environmental agreements. No known commercial sporting interests	
South Farden and Bridgend Land Ref 1 Figure 7.1e	Crop and livestock	Total farm area approximately 77ha. Land in grass and arable cropping. LCA Class 3_2 land. Supports cereals and commercial livestock. No woodland. No known commercial sporting interests. No known environmental agreements	Medium

The sensitivity assessment analysis indicates that of the 28 affected interests, six are High, 17 are Medium, and five are Low.

The six High sensitivity land interests include three equestrian units (Hill of Menie Croft, Seven Acres and Stoneyards), one intensive pig, cattle and arable unit (Pitmillan), one dairy farm (Pitgersie) and one commercial forestry operation including a Christmas tree enterprise (Fornety). The 17 Medium sensitivity holdings support livestock (cattle and sheep) and arable systems of moderate intensity and the remaining five Low sensitivity holdings are predominantly units that have a low level of agricultural production or are based on amenity woodland.

7.5 ASSESSMENT METHODOLOGY

The assessment of the potential impacts of the proposed scheme on agriculture was undertaken in accordance with the DMRB[85].

The assessment of the effects on agriculture, agriculturally related activities, forestry and sporting activities involves a combination of:

- desk based research of information sources in relation to agriculture, forestry and land use in the study corridor;
- consultation, where appropriate, with interested parties and organisations;
- identification of characteristics and extent of different agricultural, forestry and land management activities along the length of the proposals;
- site visits and inspections by experienced professionals; and
- interviews with the landowners and tenants whose land would be directly affected by the proposed development.

To assess the overall significance of the potential effects of the proposed scheme on agricultural, forestry and sporting activities, an objective assessment involving sensitivity to impact and magnitude of effects was adopted. This provided an assessment framework and ensured overall consistency of reporting.

Structured interviews were held with the landowners and tenants of the potentially affected farms and holdings and with forestry and sporting landowners and managers within the study corridor. This allowed the following baseline information to be ascertained:

- extent of property holdings and form of land ownership;

[85] Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 6 and subsequent amendments (The Highways Agency et. al., 1993)

- land use and management and performance levels attained;
- sporting activity and management;
- other business interests; and
- existing land management grants.

Both the magnitude of the effects and the sensitivity of the holdings or particular land uses are assessed. The assessment of the magnitude of impact is based upon the anticipated land-take identified for each land interest based on the current road model at the time and landscape and ecological mitigation proposals. Issues such as severance, access and changes in management of the land parcels are also identified and considered in the magnitude assessment. The assessments of sensitivity are based on the quality of the land affected, the type of farming activity practiced and the farm size. The assessment of magnitude and sensitivity has been based upon indicative criteria and professional judgement.

Tables 7.3 and 7.4 outline the characteristics and description of impacts for each sensitivity and magnitude rating.

Table 7.3: Sensitivity of Receptor

Sensitivity	Characteristics
High	Presence of prime quality land (Grade 1, 2, 3_1) Conventionally farmed Intensive arable cropping and/or intensive livestock systems (e.g. dairying) Land of any farm type farmed according to organic/biodynamic standards Small farm size < 50ha High value woodland that is rare or distinctive and susceptible to small changes
Medium	Presence of land of moderate quality (Grade 3_2, and 4) Conventionally farmed mixed livestock and crop systems of moderate intensity Average farm size > 50 < 100ha Moderate value woodlands tolerant of moderate levels of change
Low	Presence of land of low quality (Grade 5, 6 & 7) Conventionally farmed extensive livestock systems. Large farm size >100ha Land let out More commonplace woodland tolerant of noticeable change or undergoing substantial development

Table 7.4: Magnitude of Impact

Magnitude of Impact	Impact Description (one or more criteria)
High	• Loss of > 10% of the farmed area • High degree of severance (> 10% of the farmed area) • Access to fields compromised with longer route required and machinery restricted • High degree of disruption to cultivation patterns with high risk of change in land use • Disruption to driven shooting and high value fishing (e.g. salmon) • Potential for high degree of change in permanent or seasonal employment

Magnitude of Impact	Impact Description (one or more criteria)
	• Noticeable change to the woodland over a wide area or an intensive change over a limited area
Medium	• Loss of >5% <10% of the farmed area • Moderate degree of severance (>5% < 10% of the farmed area) • Access to fields changed but moderate increase in travelling and all machinery able to access • Moderate degree of disruption to cultivation patterns with moderate risk of change in land use • Disruption to walked up shooting and medium value fishing (e.g. trout) • Potential for moderate degree of change in permanent or seasonal employment • Small changes to the woodland over a wide area or a noticeable change over a limited area
Low	• Loss of >1% <5% of the farmed area • Low degree of severance (<5% of the farmed area) • Access changed with minimal increase in travelling and all machinery able to access • Minimal degree of disruption to cultivation patterns and low risk of change in land use • Disruption to rough shooting and low value fishing (e.g. no permit charged) • Potential for low degree of change in permanent or seasonal employment • Very minor changes to the woodland over a wide area or minor changes over a limited area
Negligible	• Negligible change to any of the above factors

Professional judgement and awareness of the relative balance of importance between sensitivity and magnitude allows the overall significance of impact to be assessed in accordance with the general approach and methods adopted in this document and the following table.

Table 7.5: Impact Significance

Magnitude	Sensitivity		
	High	**Medium**	**Low**
High	Major	Moderate/Major	Moderate
Medium	Moderate/Major	Moderate	Minor/Moderate
Low	Minor/Moderate	Minor	Negligible/Minor
Negligible	Minor	Negligible/Minor	Negligible

The table provides a guide as to the significance of impact, although it should be noted that professional judgement is used to determine the final significance category. The significance of impact is assessed without mitigation and then with mitigation to define residual effects. Additionally an assessment of the impact on business viability of each of the agricultural land holdings is made under residual effects. Aggregate effects in relation to total land lost for each land capability grade are also determined for each land interest and for the proposed scheme.

7.6 POTENTIAL IMPACTS

7.6.1 Permanent

The project could permanently impact on the scope and scale of agricultural and forestry based land management activities and the productive and sporting capacity of the land and water within the study corridor. The effects could include:

- permanent loss of agricultural land;
- permanent loss of forestry to the scheme and to windthrow mitigation;
- severance and permanent re-routing of access to fields and steading;
- permanent loss of sporting capability (shooting) in the vicinity of the road; and
- permanent loss of water supplies from boreholes.

7.6.2 Construction

During the construction phase, the project could temporarily impact on the scope and scale of agricultural and forestry based land management activities and the productive and sporting capacity of the land and water within the study corridor. The effects could include:

- temporary loss of access to fields;
- temporary alternative access routes to fields;
- temporary loss of access to water for livestock;
- damage to soils through site traffic through compaction and disturbance of topsoil/subsoil;
- disturbance to field drainage systems and consequently increased flood risk;
- loss of land for construction compounds, ancillary apparatus and materials;
- temporary loss of boundary features (fences, dykes and hedges); and
- temporary loss of sporting capability (shooting) in vicinity of works

7.6.3 Operational

- traffic effects on farm vehicles; and
- risk of disease from animals transported on the new road;

7.7 MITIGATION MEASURES

The mitigation proposals are based on:

- avoidance - routeing to avoid effects;
- reduction - provision of measures to minimise potential effect;
- offset - provision of works or compensation; and
- enhancement - provision of measures to improve existing conditions.

The scheme design has sought to avoid impacts to sensitive areas of land wherever practicable. However land-take would occur where it is considered necessary for the purposes of constructing the proposed scheme and or for associated mitigation measures such as landscaping. Where the required land-take results in the loss of land used for farming or commercial forestry, financial compensation to the value assessed by the District Valuer would be provided.

Mitigation measures with respect to agriculture, forestry and sporting activity have been developed with the aim of protecting the agricultural capability of land and

soils and the maintenance of the viability of farming units and the protection of remaining stands of woodland and forestry.

The mitigation measures incorporate the following principles:

- Reducing the temporary loss of land to agriculture and forestry during construction through construction programming, consultation with land interests and reinstatement of agricultural land, post construction.
- Provision of access for land interests to their holdings at all times during construction and operation.
- Limiting damage to agricultural capability of soils through adoption of procedures relating to soil stripping, handling and storage during construction and reinstatement.
- Pre-construction drainage works where required and reinstatement/provision of new drainage as required to maintain agricultural land capability and avoid flooding issues.
- Provision of financial compensation as agreed and determined by the District Valuer.

Consultation with landowners and tenants is ongoing and additional accommodation works such as the location and type of new boundary fencing/dyking, new field access, livestock handling pens, drainage works etc. have been discussed. However, these have yet to be finally agreed. Specific agreed mitigation measures and accommodation works would be included within the construction contract. For the purposes of the assessment of effects, provision of field and steading access, re-instatement of boundary features, re-instatement of field drainage systems, re-instatement of water supplies and areas of land to be returned to agriculture have all been assumed.

Discussions are ongoing between the farm at Pitmillan and the Scottish Agricultural College (on behalf of Transport Scotland) to identify the most appropriate measures to discourage the risk of airborne disease to pigs. The new road would be closer to the farm and appropriate mitigation would be implemented as part of the final detailed design.

Financial compensation would be provided for areas of agriculture land, woodland or forestry lost as a result of the construction or operation of the proposed scheme, and where this is in accordance with the District Valuer's assessment.

The various mitigation measures to reduce effects on agriculture, forestry and sporting activity are listed in Table 7.6. Mitigation is considered for each land interest. A series of mitigation measures are proposed from the mitigation item list and applied on a case-by-case basis depending on the impact and the scope for mitigation.

Details of the mitigation measures to be employed on a farm-by-farm basis are detailed for each of the land interests in Appendix 7.2.

Table 7.6: Agriculture, Forestry and Sporting Mitigation Measures

Mitigation Measure	
AG1	Permanent loss of agricultural land and forestry would be reduced through route selection, construction programming and planning and re-instatement post construction
AG2	Access to agricultural land and woodland would be provided at all times during the construction process and post construction. Where appropriate and justified, agricultural overbridges and underpasses would be incorporated into the road design
AG3	Damage to the agricultural capability of soils would be avoided by the adoption of appropriate measures during construction and reinstatement
AG4	Existing field and forestry drainage systems would be re-instated to ensure that land capability is maintained and flooding would not be exacerbated
AG5	Financial compensation would be provided for the loss of agricultural land, forestry or land with sporting interests, as agreed with the District Valuer
AG6	Notice of intention to commence construction work would be given to the owners and occupiers of all land along the route before entry is made to such land. Consultation with the landowners and occupiers would allow agreement to a programme of works that minimises disturbance. Any work would be carried out in accordance with the agreed programme as far as is practically possible
AG7	Preparation of a schedule of condition for agricultural land (including drainage), forestry, roads and paths likely to be affected by the proposed development. This would be made available to the owner or occupier and would ensure that land, roads and paths are restored to the reasonable satisfaction of the landowner or occupier
AG8	Agriculture, forestry and sporting roads and paths would be re-instated to a condition equivalent to that subsisting before the commencement of any works
AG9	Agricultural land would be re-instated to a condition as near as is reasonably practicable to that subsisting before the commencement of the works. Topsoil where disturbed would be left in a loose friable condition and where agreed appropriate cover would be replaced. Re-grading where appropriate would be undertaken and land returned to agriculture
AG10	Where ancillary apparatus and material is sited on agricultural land it would be done so with agreement of the land owner/occupier
AG11	There would be provision of temporary fences, lights and guards in appropriate locations for the protection of the health and safety of the public and animals and to avoid trespass. Where appropriate, fencing of the working area to a standard adequate for the purpose of excluding any stock kept on adjoining land would be undertaken. All temporary fencing would be maintained in position during constructional work and thereafter unless otherwise agreed with the occupier
AG12	Where boundary features such as fences, walls and hedges have to be removed to allow construction these would be reinstated with appropriate materials in each case to provide a secure field boundary
AG13	Precautions relating to the exclusion of stock would be combined with due care and attention by construction staff to prevent the straying of livestock
AG14	Where access would require to be altered either temporarily or permanently as a result of construction, alternative access for stock and machinery would be provided as appropriate in consultation with the land owner/occupier. Recessed access would be provided off main and side roads as appropriate with loading/unloading area if required
AG15	All reasonable precautions would be taken during construction to avoid as far as is possible, the spreading of soil borne pests and diseases, and animal and crop diseases. Precautions as recommended by the Scottish Executive Environment and Rural Affairs Department would be observed
AG16	Where an increased livestock disease risk is identified, reasonable claims in respect of injurious affection or disturbance would be payable.
AG17	Careful excavation, storage and replacement of topsoil and subsoil would avoid damage to soils and soil structure and to protect the agricultural capability. Soil bunds would not exceed 1.5m in height
AG18	Particular care would be taken to minimise damage or disturbance to field drains. Laying of new drains would be undertaken as required to keep the affected and adjoining land in good order. Repairing and reinstatement of field drains would be agreed with the land owner/occupier. Where appropriate the integrity of the drainage system would be secured in advance through the installation of header drains (cut off drains) to facilitate construction. All remaining remedial and new drainage works to be undertaken post construction
AG19	Water supplies for livestock would be protected at all times and alternative supplies would be provided where access would be compromised by any works
AG20	An assessment would be made of the risk of windthrow from any proposed felling and management measures defined for each section of woodland. These would include felling to windfirm edges, topping, pollarding and coppicing
AG21	All felling to create a windfirm edge would take account of ecological landscape and visual effects and designed to maximise where possible ecological, landscape/visual

Mitigation Measure	
	opportunities
AG22	Where there are no windthrow or landscape visual issues, tree felling would be minimised to that necessary to allow the safe construction and operation of the road
AG23	Soil disturbance and compaction from harvesting and extraction would be minimised
AG24	Reasonable claims in respect of damage to agricultural land or sporting rights, injurious affection and disturbance would be payable, as would professional charges

The majority of the proposed mitigation would relate to the provision of access to fields and severed areas, reinstatement of boundary features (drystone walls and fences) as well as watering points for livestock, and provision of new or reinstated field drainage systems. Table 7.7 identifies where a need has been identified for a dedicated agricultural accommodation overbridge or underpass. In all other situations where access is changed agricultural use of public overbridges and underbridges as part of the scheme is assumed.

Re-grading of agricultural land has been proposed as part of the landscape mitigation proposals (see Landscape and Visual Effects, Chapter 11). Some of this land has the potential to be returned to agricultural use, limiting the agricultural area permanently lost to the proposed scheme. The land interests subject to this re-grading and return to agricultural use are also listed in Table 7.7.

No requirement of felling mitigation to protect against windthrow with subsequent replanting of some felled areas has been identified.

Table 7.7: Mitigation Works

Mitigation	Description	Benefiting Land Reference
Agricultural accommodation underpass	Agricultural underpass at ch4200 for use by agricultural vehicles, machinery and livestock	Aikenshill, Land Ref 14
Signalised and gated Livestock Crossing	Livestock crossing point on realigned B977 at ch850 with warning signals and gates. Holding areas on east and west sides of the crossing point	Keir Farm, Land Ref 38
Re-grading of embankments with potential to return to agricultural use	Return of a total area of 0.39ha of LCA Class 3_1 (0.27ha) and 3_2 (0.12ha) land on west side of main alignment between ch1300 and ch1500	South Orrock, Land Ref 22, (0.27ha) Boghead, Land Ref 18, (0.12ha)
	Return of 4.48ha of LCA Class 3_2 land (4.40ha) and woodland (0.08ha) on both sides of the main alignment between ch3400 and ch4000	Aikenshill, Land Ref 14
	Return of 1.77ha of LCA Class 3_2 land on east side of main alignment between ch4800 and ch5300	Overhill and Kirkhill Farm, Land Ref 13, (1.39ha) Pitgersie, Land Ref 12, (0.38ha)
	Return of 6.35ha of LCA Class 3_2 land on west side of main alignment between ch5300 and ch6000	Pitgersie, Land Ref 12
	Return of 3.81ha of LCA Class 3_2 land on east side of main alignment between ch7100 and ch7600	Pitmillan and Fountainbleau, Land Ref 7, (3.05ha) Meikle Haddo, Land Ref 5, (0.76ha)

7.8 ASSESSMENT OF RESIDUAL EFFECTS

7.8.1 Permanent

The magnitude and significance of residual impacts have been determined for each of the affected land interests. These are detailed in Appendix 7.2.

The post mitigation significance of residual effects (adverse) are summarised in Table 7.8.

Table 7.8: Adverse Residual Effects of Proposed Development

Significance of Residual Effect (Adverse)						
Major	**Moderate/ Major**	**Moderate**	**Minor/ Moderate**	**Minor**	**Negligible/ Minor**	**Negligible**
4	7	9	1	3	4	0

The assessments make allowance for land to be returned to agricultural use. Twenty (71%) have a significance of residual effect of moderate or above. Eight land interests (29%) have a significance of residual effect (adverse) of below moderate.

Although mitigation measures have been developed, the adverse residual effects are broadly similar to the impacts before mitigation. This is because the major impact of the proposed development is loss of agricultural/forestry land and although mitigation has been developed to restore access, minimise the impact of severance and return land to agricultural use where possible (see Chapter 11), the loss of land remains and would only be mitigated by financial compensation. Nevertheless, mitigation reduces the significance of residual effect on two land interests. These are:

- **Aikenshill** – provision of accommodation underpass and land returned to agriculture;
- **Pitgersie** - provision of land returned to agriculture.

The land-take effects of the proposed development are summarised in Table 7.9.

Table 7.9: Land-take of Agricultural and Commercial Forestry Land

	Prime Agricultural Land (ha)			Non-Prime Agricultural Land (ha)					Woodland (ha)	Totals (ha)
	LCA Class			LCA Class						
	1	2	3.1	3.2	4	5	6	7		
Land Subject to CPO and Purchase by Landowner Agreement	0.00	0.00	20.99	84.82	0.00	0.00	0.00	0.00	11.87 (of which 6.41ha is commercial forestry)	117.68
Temporary Land Loss (Land Returned to Agriculture)	0.00	0.00	0.27	16.45	0.00	0.00	0.00	0.00	0.08	16.80
Net Loss	0.00	0.00	20.72	68.31	0.00	0.00	0.00	0.00	11.79(6.41ha commercial forestry)	100.82

Approximately 117.68ha of land would be subject to CPO or to purchase by landowner agreement. It is expected that 16.80ha of this would be returned to agriculture leaving a net area subject to the CPO and purchase by landowner agreement of 100.88ha. Of this 21% is prime land (20.72ha), 68% is non-prime land (68.37ha), and a further 11% is forestry or woodland (11.79ha). The prime land lost is mainly located in the southern section of the proposed route. The loss of commercial forestry is located at Aikenshill and Fornety.

Of the net 100.88ha agricultural land subject to the CPO and purchase by landowner agreement, an estimated 12.76ha would be planted in mixed, coniferous, broadleaved, scrub and riparian woodland.

7.8.1.1 Effects on Farm Viability

Assessments have been made of the effects of land-take and severance on the viability of the farm interests. The financial impact of the proposed development has been assessed, in broad terms, using standard performance figures

produced by SEERAD and adapted by SAC for different farm types. This has helped inform the assessment of the impact on farm viability which has also been based upon professional judgement.

Farms, which had an adverse significance of residual effect of below moderate, were assumed to remain viable. All farms with an adverse significance of residual effect of above moderate had their viability assessed (see Appendix 7.2 for full assessment of impacts) to determine whether or not they would remain viable.

It is assumed that for all businesses, compensation as agreed with the District Valuer would be available for compulsory purchase, severance, injurious affection and disturbance.

Viability is assessed as being affected on only one land interest. Seven Acres (Land Ref 29) would lose 4.23ha (34% of farm area) to the proposed scheme. Additionally, some 2.05ha (16% of farm area) would be severed. The high proportion of land lost and severance would limit the land available for equestrian purposes, hay-making and land let out. Additionally, part of the cross country equestrian course would be severed by the main alignment. Together these factors would compromise the future viability of the unit. Although Hill of Menie Farm (Land Ref 45) would have all of its land (0.42ha) lost to the proposed project, the land is in scrub woodland and is not currently used by its owners for agricultural or commercial forestry purposes. As there is no commercial activity this land interest is not assessed as being unviable.

7.8.2 Construction

Impacts such as temporary loss of land and access and general disturbance would be experienced during construction. However construction programming and mitigation as proposed limits the impact on agricultural units during the construction phase as far as practically possible and it is not viewed that these would be significant effects.

7.8.3 Operational

Reduction in traffic on the existing A90 would benefit the movements of farm vehicles on the road by allowing easier access and less delays from congestion. A risk of airborne disease to pigs at Pitmillan Farm has been raised by the owner because the new road would be closer to the farm than the existing A90. No mitigation as part of the scheme design is possible. The increased airborne disease risk can be managed by appropriate vaccination of stock. Reasonable claims for injurious affection and disturbance would be payable.

7.9 SUMMARY

- There are 28 agricultural, commercial forestry and sporting land interests which would be affected by the proposals. These collectively farm some 1,994ha.
- The proposed development has adverse residual effects (moderate or above) on 20 land interests (71%). It is predicted that viability would be compromised on one unit, Seven Acres, Land Ref 29.
- It is estimated that 117.68ha of agricultural and commercial forestry land would be subject to compulsory purchase and purchase by landowner agreement to construct the proposed scheme. Some 16.80ha would be available to be returned to agriculture reducing the net loss of agricultural land

to 100.88ha. This includes 20.72ha of Prime Agricultural Land; 68.37ha of non-Prime Agricultural Land and 11.79ha of forestry and woodland.

- Farmers would be financially compensated for the value of land lost and for injurious affection and disturbance.

APPENDIX 7.1

LAND CAPABILITY DESCRIPTORS

Land Suited to Arable Cropping

Class 1, Land capable of producing a very wide range of crops
Cropping is highly flexible and includes the more exacting crops such as winter harvested vegetables (cauliflower, brussels sprouts, leeks). The level of yield is consistently high. Soils are usually well-drained deep loams, sandy loams, silty loams or their related humic variants with good reserves of moisture. Sites are level or gently sloping and the climate is favourable. There are no or only very minor physical limitations affecting agricultural use.

Class 2, Land capable of producing a wide range of crops
Cropping is very flexible and a wide range of crops can be grown but the land may be unsuited to winter harvested crops. The level of yield is high but less consistently obtained than on Class 1 land due to the effects of minor limitations affecting cultivation, crop growth or harvesting. The limitations include, either singly or in combination, slight workability or wetness problems, slightly unfavourable soil structure or texture, moderate slopes or slightly unfavourable climate. The limitations are always minor in their effects and land in the class is highly productive.

Class 3, Land capable of producing a moderate range of crops
Land in this class is capable of producing good yields of a narrow range of crops, principally cereals and grass, and/or moderate yields of a wider range including potatoes, some vegetable crops (e.g. field beans and summer harvested brassicae) and oilseed rape. The degree of variability between years will be greater than is the case for Classes 1 and 2, mainly due to interactions between climate, soil and management factors affecting the timing and type of cultivations, sowing and harvesting. The moderate limitations require careful management and include wetness, restrictions to rooting depth, unfavourable structure or texture, strongly sloping ground, slight erosion or a variable climate. The range of soil types within the class is greater than for previous classes.

Class 3, division 3_1
Land in this division is capable of producing consistently high yields of a narrow range of crops (principally cereals and grass) and/or moderate yields of a wider range (including potatoes, field beans and other vegetables and root crops). Short grass leys are common.

Class 3, division 3_2
This land is capable of average production but high yields of barley, oats and grass are often obtained. Other crops are limited to potatoes and forage crops. Grass leys are common and reflect the increasing growth limitations for arable crops and degree of risk involved in their production.

Class 4, Land capable of producing a narrow range of crops
The land is suitable for enterprises based primarily on grassland with short arable breaks (e.g. barley, oats, forage crops). Yields of arable crops are variable due to soil, wetness or climatic factors. Yields of grass are often high but difficulties of production or utilisation may be encountered. The moderately severe levels of limitation restrict the choice of crops and demand careful management. The limitations may include moderately severe wetness, occasional damaging floods, shallow or very stony soils, moderately steep gradients, moderate erosion risk,

moderately severe climate or interactions of these which increase the level of farming risk.

Class 4, division 4_1
Land in this division is suited to rotations, which, although primarily based on ley grassland, include forage crops and cereals for stock feed. Yields of grass are high but difficulties of utilisation and conservation may be encountered. Other crop yields are very variable and usually below the national average.

Class 4, division 4_2
The land is primarily grassland with some limited potential for other crops. Grass yields can be high but difficulties of conservation or utilisation may be severe, especially in areas of poor climate or on very wet soils. Some forage cropping is possible and, when the extra risks involved can be accepted, an occasional cereal crop.

Land Suited Only to Improved Grassland and Rough Grazing

Class 5, Land capable of use as improved grassland
The agricultural use of land in Class 5 is restricted to grass production but such land frequently plays an important role in the economy of British hill lands. Mechanised surface treatments to improve the grassland, ranging from ploughing through rotavation to surface seeding and improvement by non-disruptive techniques are all possible. Although an occasional pioneer forage crop may be grown, one or more severe limitations render the land unsuited for arable cropping. These include adverse climate, wetness, frequent damaging floods, steep slopes, soil defects or erosion risks. Grass yields within the class can be variable and difficulties in production, and particularly utilisation, are common.

Class 5, division 5_1
Establishment of a grass sward and its maintenance present few problems and potential yields are high with ample growth throughout the season. Patterns of soil, slope or wetness may be slightly restricting but the land has few poaching problems. High stocking rates are possible.

Class 5, division 5_2
Sward establishment presents no difficulties but moderate or low trafficability, patterned land and/or strong slopes cause maintenance problems. Growth rates are high and despite some problems of poaching satisfactory stocking rates are achievable.

Class 5, division 5_3
Land in this division has properties which lead to serious trafficability and poaching difficulties and although sward establishment may be easy, deterioration in quality is often rapid. Patterns of soil, slope or wetness may seriously interfere with establishment and/or maintenance. The land cannot support high stock densities without damage and this may be serious after heavy rain even in summer.

Class 6, Land capable of use only as rough grazings
The land has very severe site, soil or wetness limitations, which generally prevent the use of tractor-operated machinery for improvement. Reclamation of small areas to encourage stock to range is often possible. Climate is often a very

significant limiting factor. A range of widely different qualities of grazing is included from very steep land with significant grazing value in the lowland situation to moorland with a low but sustained production in the uplands. Grazing is usually insignificant in the full arctic zones of the mountain lands, but below this level grazings which can be utilised for five months or longer in any year are included in the class. Land affected by severe industrial pollution or dereliction may be included if the effects of the pollution are non-toxic.

Class 6, division 6_1
Land in the division has high proportions of palatable herbage in the sward, principally the better grasses, e.g. meadow grass-bent grassland, bent-fescue grasslands.

Class 6, division 6_2
Moderate quality herbage such as white and flying bent grasslands, rush pastures and herb-rich moorlands or mosaics of high and low grazing values characterise land in the division.

Class 6, division 6_3
The vegetation is dominated by plant communities with low grazing values, particularly heather moor, bog heather moor and blanket bog.

Class 7, Land of very limited agricultural value
This land has extremely severe limitations that cannot be rectified. The limitations may result from one or more of the following: extremely severe wetness, extremely stony, rocky land, unvegetated soils, scree or beach gravels, toxic waste tips and dereliction, very steep gradients, severe erosion including intensively hagged peat lands and extremely severe climates (exposed situations, protracted snow-cover and short growing season). Agricultural use is restricted to very poor rough grazing.

APPENDIX 7.2

RESIDUAL EFFECTS FOR ALL AFFECTED LAND INTERESTS

Land Interest	Description of Potential Impact	Sensitivity[86]	Magnitude [87]	Significance[88]	Description of Proposed Mitigation Measures	Significance of Residual Effect
Easter Hatton Landfill Site Land Ref 46	Loss of 0.36ha Class 3.2 land to creation of the Easter Hatton Link. One field affected. Land lost equates to less than 1% of the estimated land holding area. No severance. Loss of boundary features and disruption to field drainage system	M	N	Neg/Min	Reinstatement of boundary features along the new Easter Hatton Link. Reinstatement of field drainage, tying in with road drainage scheme where appropriate AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG24	Neg/Min
Land near Blackdog Land Ref 47	Loss of 1.62ha Class 3.2 land to creation of Easter Hatton Link. One field affected. Land lost equates to 3% of estimated land holding area. No severance. Loss of boundary features and disruption to field drainage system	M	L	Min	Reinstatement of boundary features along the new Easter Hatton Link. Reinstatement of field drainage, tying in with road drainage scheme where appropriate AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG24	Min
Balmedie Junction East Land Ref 44	Loss of 3.50ha of Class 3.2 land to creation of Balmedie Junction. Three fields affected with total loss of one field and partial loss of others. Land lost equates to 11% of total farmed area. No severance. Loss of field boundary features, field access and disruption to field drainage system and livestock watering points	M	M	Mod	Access to easternmost field provided from road into Balmedie. Access to other fields from this field. Reinstatement of boundary features along main alignment, bordering new junction and along road into Balmedie. Provision of access between remaining two fields. Reinstatement of field drainage, tying in with road drainage scheme where appropriate. Reinstatement of field watering points to ensure livestock have access to water in all fields affected AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG24	Mod
Southfolds Farm	Loss of 4.17ha of Class 3.2 land to Balmedie Junction. Three fields affected with total loss of two fields and partial loss of one other.	M	H	Mod/Maj	Access to field provided from new steading access. Reinstatement of boundary feature.	Mod/Maj

[86] L = Low, M = Medium, H = High
[87] H = High, M = Medium, L = Low, N = Negligible
[88] Maj = Major, Mod = Moderate, Min = Minor, Neg = Negligible

Land Interest	Description of Potential Impact	Sensitivity[86]	Magnitude[87]	Significance[88]	Description of Proposed Mitigation Measures	Significance of Residual Effect
Farm Land Ref 37	Land lost equates to 17% of total farmed area. 0.82ha severed (3% of farm area). Revised access to steading with new access created from western roundabout of Balmedie Junction. Loss of field boundary feature through creation of steading accesses, field access and disruption to field drainage system and livestock watering point				Reinstatement of field drainage, tying in with road drainage scheme where appropriate. Reinstatement of field watering point to ensure livestock have access to water in all fields affected AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG24	
Keir Farm Land Ref 38	Loss of 5.08ha to B977 realignment, main alignment earthworks and pedestrian access track. Of the land lost, 5.03ha is Class 3.2 land and 0.05ha is woodland. 12 fields affected, all with partial loss of land. Land lost equates to 7% of total farmed area. 16.83 ha severed (24% of farm area) by B977 realignment. Loss of field boundary features, field access, watering points for livestock and disruption to field drainage system (NMU = Non Motorised User, pedestrian, equestrian etc)	M	H	Mod/Maj	Access to severed land provided by creation of signalled and gated livestock crossing on B977 at ch850. Additional provision of holding areas on east and west side of crossing point. Reinstatement of boundary features in fields severed by B977 realignment along with provision of new access to fields as required. Additionally, amalgamation of fields as required. Watering points for livestock restored and provided as new to ensure livestock have access to water in all affected fields. Reinstatement of field drainage, tying in with road drainage scheme where appropriate. No additional felling in woodland compartment at ch100 to mitigate windthrow proposed.. AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG20, AG21, AG22, AG23, AG24	Mod/Maj
Millden House East Land Ref 39	Loss of 0.31ha of Class 3.2 land to main alignment embankments and NMU access track. One field affected with partial loss of land on eastern and northern boundaries. Land lost equates to 15% of total area. No land severed. Loss of northern and eastern field boundary features. Loss of field access and disruption to field drainage system	L	H	Mod	Reinstatement of boundary features and provision of new access to field from NMU access track. Reinstatement of field drainage, tying in with road and track drainage schemes where appropriate AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG24	Mod

Land Interest	Description of Potential Impact	Sensitivity[86]	Magnitude[87]	Significance[88]	Description of Proposed Mitigation Measures	Significance of Residual Effect
Balmedie Farm Land Ref 43	Loss of 1.75ha of Class 3.2 land to B977 realignment. Two fields affected with partial loss of land in each. Land lost equates to estimated 3% of total farmed area. 1.03 ha severed (estimated 2% of farm area). Loss of field boundary features, field access and disruption to field drainage system and livestock watering points	M	L	Min	Access to severed land provided across realignment of B977 at ch1300. Reinstatement of boundary features along B977 realignment. Amalgamation of land to east of B977 realignment into one field. Reinstatement of field drainage, tying in with road drainage scheme where appropriate. Provision of watering point for livestock in land to east of B977 realignment AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG24	Min
South Orrock Land Ref 22	Loss of 10.55ha to main alignment, associated earthworks and South Orrock Underpass. Of the land lost, 8.22ha is Class 3.1 land, 2.23ha is Class 3.2 land and 0.10ha is woodland. 9 fields affected, all with partial loss of land. Land lost equates to 12% of total farmed area. 4.74ha of land to east of main alignment severed (6% of farm area). Loss of field boundary features, field access and disruption to field drainage system and livestock watering points	M	H	Mod/Maj	Access provided to steading by South Orrock underpass. This also provides access to severed land to east of the main alignment. Regrading allows potential 0.27ha Class 3.1 land to be returned to agriculture. This limits total land lost to 10.28ha (12% of farm area). Reinstatement of field boundary features along main alignment and along realigned steading access track. Provision of new access to fields to west and east of main alignment from new steading access track. Reinstatement of field drainage, tying in with road and access track drainage scheme as appropriate. Provision of watering points for livestock as appropriate to ensure livestock have access to water in all affected fields. No additional felling to mitigate windthrow required AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG20, AG21, AG22, AG23, AG24	Mod/Maj
Blairton Land Ref 23	Loss of 0.21ha to realignment of existing A90. Land lost is Class 3.2. One field affected. Land lost equates to less than 1% of farm area. No severance. Loss of field boundary features and disruption to field drainage system	M	N	Neg/Min	Reinstatement of field boundary features along existing A90 and watercourse. Reinstatement of field drainage, tying in with road and access track drainage scheme as appropriate	Neg/Min

Land Interest	Description of Potential Impact	Sensitivity[86]	Magnitude [87]	Significance[88]	Description of Proposed Mitigation Measures	Significance of Residual Effect
					AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG24	
Boghead Land Ref 18	Loss of 6.95ha to main alignment and associated earthworks, realignment of minor road (including provision of Orrock Overbridge) and realignment of Orrock house access. Of the land lost, 5.79ha is Class 3.1 land and 1.16ha is Class 3.2 land. 6 fields affected all with partial loss of land. Land lost equates to 6% of total farmed area. 11.10ha of land to east of main alignment severed (9% of farm area). Loss of boundary features, field access and disruption to field drainage system and livestock watering points	M	M	Mod	Access provided to steading by Orrock Overbridge. This also provides access to severed land to east of main alignment. Regrading allows potential 0.12ha Class 3.2 land to be returned to agriculture. This limits total land lost to 6.83ha (6% of farm area). Reinstatement of field boundary features along main alignment, realignment of minor road including Orrock Overbridge and along Orrock House access. Provision of new access to fields to west and east of main alignment from realignment of minor road and Orrock Overbridge. Reinstatement of field drainage, tying in with main alignment and minor road drainage scheme as appropriate. Provision of watering points for livestock as appropriate to ensure livestock have access to water in all affected fields AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG24	Mod
Pettens Land Ref 19	Loss of 0.38ha to realignment of minor road (including provision of Orrock Overbridge). Loss of 0.38ha Class 3.1 land. One field partially affected. Land lost equates to less than 1% of total farm area. 0.41ha of land to north of realigned minor road severed (less than 1% of farm area). Disruption to boundary features, field access, field drainage system and livestock watering point	M	Neg	Neg/Min	Access provided to severed land to north of realigned minor road by provision of new field access and field boundary features. Reinstatement of field drainage, tying in with minor road drainage scheme as appropriate. Provision of watering points for livestock as appropriate to ensure livestock have access to water in affected field and severed area AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG24	Neg/Min

Land Interest	Description of Potential Impact	Sensitivity[86]	Magnitude [87]	Significance[88]	Description of Proposed Mitigation Measures	Significance of Residual Effect
The Firs Land Ref 17	Loss of 0.87ha to main alignment. Of this land lost, 0.64ha is Class 3.2 land and 0.23ha is woodland. Three fields partially affected of which one is in woodland. Land lost equates to 15% of total farm area. 0.45ha of land to west of main alignment severed (8% of farm area). Disruption to boundary features, field access, field drainage system and livestock watering point	M	H	Mod/Maj	Access provided to severed land to west of main alignment using Dambrae Underpass and new access road on west of main alignment and via new track parallel to main alignment. Land area left is small and not well suited for agricultural use. However, could be used for planting. Provision of new field boundary features along main alignment. Provision of new access between fields to east of main alignment. No additional felling to mitigate windthrow required. Reinstatement of field drainage, tying in with road drainage scheme as appropriate. Provision of watering points for livestock as appropriate to ensure livestock have access to water in affected fields AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG20, AG21, AG22, AG23, AG24	Mod/Maj
Hill of Menie Croft Land Ref 30	Loss of 0.24ha of Class 3.1 land to main alignment. 1 field partially affected. Land lost equates to 13% of total farmed area. No severance. Loss of boundary features and disruption to field drainage system	H	H	Maj	Reinstatement of boundary features and field drainage, tying in with road drainage scheme as appropriate AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG24	Maj
Seven Acres Land Ref 29	Loss of 4.23ha of Class 3.2 land to main alignment, new access road to west of main alignment and drainage detention pond to east of main alignment. 2 fields affected. Land lost equates to 34% of total farmed area. 2.05 ha severed by main alignment (16% of farm area). Severance includes part of equestrian cross country course. Loss of boundary features, field access and disruption to field drainage system and livestock watering points	H	H	Mod/Maj	Access provided to severed area using Dambrae Underpass. Reinstatement of boundary features along main alignment and new access road to west of main alignment. Provision of new access into field to east of main alignment using shared access for Land Ref 17. Reinstatement of field drainage, tying in with road drainage system as appropriate. Provision of watering points for livestock as appropriate to ensure livestock have access to water in affected fields	Maj

Land Interest	Description of Potential Impact	Sensitivity[86]	Magnitude[87]	Significance[88]	Description of Proposed Mitigation Measures	Significance of Residual Effect
					AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG23	
Hill of Menie Farm Land Ref 45	Total loss of 0.42ha woodland to main alignment.	L	H	Maj	No mitigation possible.	Maj
Dambrae Land Ref 15	Loss of 1.53ha to main alignment and Dambrae Underpass. Of this 0.15ha is Class 3.2 land and 1.38ha is woodland. 2 fields affected each with partial loss of land. Land lost equates to 17% of total farmed area. 1.38ha ha severed by main alignment (16% of farm area). Loss of two ponds. Loss of boundary features, field access and disruption to field drainage system	L	H	Mod	Access to severed area provided from Dambrae Underpass. Reinstatement of boundary features along main alignment and on Dambrae Underpass. Provision of new access to fields as required. Reinstatement of field drainage, tying in with road drainage scheme as appropriate. No additional felling to mitigate windthrow required AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG20, AG21, AG22, AG23, AG24	Mod
Stoneyards Land Ref 28	Loss of 1.00ha of Class 3.1 land to main alignment. One field affected. Land lost equates to 7% of total farmed area. 0.35ha severed by main alignment (3% of farm area). Loss of boundary features, field access and disruption to field drainage system along with field watering point	H	M	Mod/Maj	Access to severed area provided via Dambrae Underpass, existing A90 and access track running west from existing A90. Severed area small and not well suited to agriculture. However, suitable for woodland planting. Reinstatement of boundary features along main alignment. Reinstatement of field drainage, tying in with road drainage scheme as appropriate AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG24	Mod/Maj
Aikenshill Land Ref 14	Loss of 11.92ha of land to main alignment and associated earthworks. Of this, 8.84ha is Class 3.2 land and 3.08ha is woodland. 6 fields affected all with partial loss of land. Land lost equates to 10% of total farmed area. 50.00ha of land to east of main alignment severed (43% of farm area). Loss of boundary features, field access and disruption to field drainage system and	M	H	Mod/Maj	Access to severed land provided by accommodation underpass at ch4200. Regrading allows potential 4.40ha Class 3.2 land to be returned to agriculture plus 0.08ha to be returned to forestry. This limits total land lost to 7.44ha (6% of farm area). Reinstatement of boundary	Mod

Land Interest	Description of Potential Impact	Sensitivity[86]	Magnitude[87]	Significance[88]	Description of Proposed Mitigation Measures	Significance of Residual Effect
	watering arrangements for livestock				features along main alignment and amalgamation of fields as required. Provision of new access to fields as required. Reinstatement of field drainage, tying in with road drainage scheme as appropriate. Provision of watering points for livestock as appropriate to ensure livestock have access to water in affected fields. No additional felling to mitigate windthrow required AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG20, AG21, AG22, AG23, AG24	
Overhill and Kirkhill Farm Land Ref 13	Loss of 14.00ha of Class 3.2 land to main alignment, Newburgh Road Junction and realignment of Kirkhill access road. 6 fields affected with partial loss of land in each. Land lost equates to 6% of total farmed area. 15.15ha severed by main alignment and Newburgh Road Junction (6% of farm area). Loss of boundary features, field access and disruption to field drainage system and access to livestock watering points	M	M	Mod	Access to severed land provided using Newburgh Road Junction. Regrading allows potential 1.39ha Class 3.2 land to be returned to agriculture. This limits total land lost to 12.61ha (5% of farm area). Reinstatement of boundary features along main alignment and Newburgh Road Junction including amalgamation of fields as required. Provision of new field access points from Newburgh Road. Reinstatement of field drainage, tying in with road drainage scheme as appropriate. Provision of watering points for livestock as appropriate to ensure livestock have access to water in affected fields AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG24	Mod
Pitgersie Land Ref 12	Loss of 14.00ha of Class 3.2 land to main alignment, Newburgh Road Junction and realignment of Newburgh Road. 3 fields affected with partial loss of land in each. Land lost equates to 5% of total farmed area. 1.69ha severed by realignment of Newburgh Road Junction on land to east of main alignment (1% of farm area). Loss of boundary features, field access and disruption to field drainage system and access to livestock watering points	H	M	Mod/Maj	Access to severed land provided by creation of new field access from realigned Newburgh Road. Regrading allows potential 6.73ha Class 3.2 land to be returned to agriculture. This limits total land lost to 7.27ha (3% of farm area). Reinstatement of boundary features along main alignment and realigned Newburgh Road. Provision of new field	Mod

Land Interest	Description of Potential Impact	Sensitivity[86]	Magnitude[87]	Significance[88]	Description of Proposed Mitigation Measures	Significance of Residual Effect
					access points from existing A90 and Newburgh Road. Reinstatement of field drainage, tying in with road drainage scheme as appropriate. Provision of watering points for livestock as appropriate to ensure livestock have access to water in affected fields AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG24	
Mill of Foveran Land Ref 9	Loss of 2.54ha to main alignment and Foveran Overbridge. Of land lost, 2.21ha is Class 3.2 land and 0.33ha is woodland. 2 fields affected with partial loss of land in each. Land lost equates to 24% of total farmed area. 2.27 ha severed by main alignment (22% of farm area). Loss of boundary features, field access and disruption to field drainage system and access to livestock watering points	M	H	Mod/Maj	Access to severed land provided using Foveran Overbridge. Reinstatement of boundary features along main alignment and Foveran Overbridge. Provision of new access to fields from realigned Foveran Road. Reinstatement of field drainage, tying in with road drainage scheme as appropriate. Provision of watering points for livestock as appropriate to ensure livestock have access to water in affected fields AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18,	Mod/Maj
Oldmill Land Ref 8	Loss of 0.20ha woodland to main alignment. One field affected. Land lost equates to 7% of total farmed area. Loss of boundary features and disruption to field drainage system	L	M	Min/Mod	Reinstatement of boundary features along main alignment. Reinstatement of field drainage, tying in with road drainage scheme as appropriate AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG20, AG21, AG22, AG23, AG24	Min/Mod
Linnhead Farm Land Ref 10	Loss of 3.03ha of Class 3.2 land to main alignment. One field affected. Land lost equates to 4% of total farmed area. 3.40ha of land to west of main alignment severed (4% of farm area). Loss of boundary features, field access and disruption to field drainage system and access to livestock watering points	M	L	Min	Access to severed land provided using Foveran Overbridge. Reinstatement of boundary features along main alignment. Reinstatement of field drainage, tying in with road drainage scheme as appropriate. Provision of watering points for livestock as appropriate to ensure livestock have	Min

Land Interest	Description of Potential Impact	Sensitivity[86]	Magnitude[87]	Significance[88]	Description of Proposed Mitigation Measures	Significance of Residual Effect
					access to water in affected fields AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG24	
Pitmillan and Fountainbleau Land Ref 7	Loss of 7.51ha to main alignment, Pitmillan Overbridge and realignment of B9000 Pitmedden Road. Of the land lost, all is Class 3.2 land. 7 fields affected. Land lost equates to 7% of total farmed area. 41.50ha severed by main alignment (45% of farm area). Loss of boundary features, field access and disruption to field drainage system and access to livestock watering points. Loss of borehole water supply to farm steading and field water troughs. Increased airborne disease risk from close proximity (290m) of pig accommodation to the road	H	H	Maj	Access to severed land provided by Pitmillan overbridge, Tipperty Junction and realignment of B9000 Pitmedden Road. Regrading allows potential 3.05ha Class 3.2 land to be returned to agriculture. This limits total land lost to 4.46ha (5% of farm area). Reinstatement of boundary features along main alignment and realigned B9000 Pitmedden Road. Provision of new field access points from Pitmillan Overbridge and realigned B9000 Pitmedden Road. Reinstatement of field drainage, tying in with road drainage scheme as appropriate. Provision of watering points for livestock as appropriate to ensure livestock have access to water in affected fields. Provision of new borehole supply for steading and troughs. Increased airborne disease mitigated through pig vaccination and appropriate, reasonable compensation AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG24	Maj
Meikle Haddo Land Ref 5	Loss of 11.24ha to main alignment, Tipperty Junction and detention pond. Of the land lost, all is Class 3.2 land. 2 fields affected. Land lost equates to 8% of total farmed area. 6.48ha severed by main alignment and Tipperty Junction (5% of farm area). Loss of boundary features, field access and disruption to field drainage system and access to livestock watering points	M	M	Mod	Access to severed land provided by Tipperty Junction. Regrading allows potential 0.76ha Class 3.2 land to be returned to agriculture. This limits total land lost to 10.48ha (8% of farm area). Reinstatement of boundary features along main alignment and Tipperty Junction. Amalgamation of fields as required to north and south of realigned B9000 Newburgh Road. Provision of new field access points to severed land from existing A90 and from realigned B9000 Newburgh	Mod

Land Interest	Description of Potential Impact	Sensitivity[86]	Magnitude[87]	Significance[88]	Description of Proposed Mitigation Measures	Significance of Residual Effect
					Road. Reinstatement of field drainage, tying in with road drainage scheme as appropriate. Provision of watering points for livestock as appropriate to ensure livestock have access to water in affected fields and in severed land AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG24	
Little Haddo Land Ref 4	Loss of 0.34ha to realignment of B9000 Newburgh Road. Of the land lost, all is Class 3.2 land. 2 fields affected. Land lost equates to less than 1% of total farmed area. No land severed. Loss of boundary features, field access and disruption to field drainage system	M	Neg	Neg/Min	Reinstatement of boundary features along realigned B9000 Newburgh Road. Provision of new field access points from realigned B9000 Newburgh Road as required. Reinstatement of field drainage, tying in with road drainage scheme as appropriate AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG24	Neg/Min
Fornety Land Ref 2	Loss of 6.41ha to main alignment and minor road to Fornety on east of main alignment. Of the land lost, all is in commercial woodland. 2 woodland compartments affected. Land lost equates to 8% of total farmed area. No severance. Loss of boundary features, field access and disruption to field drainage system	H	M	Mod/Maj	Reinstatement of boundary features along main alignment and realigned Fornety Road. Provision of new field access points from realigned Fornety Road as required. Reinstatement of field drainage, tying in with road drainage scheme as appropriate. No additional felling for windthrow mitigation required AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG14, AG15, AG17, AG18, AG20, AG21, AG22, AG23, AG24	Mod/Maj
South Farden and Bridgend Land Ref 1	Loss of 3.33ha to Main alignment and Tipperty Access. Of the land lost, all is Class 3.2 land. 3 fields affected. Land lost equates to 3% of total farmed area. 13.94ha severed by Tipperty Access and main alignment (18% of farm area). Loss of boundary features, field access and disruption to field drainage system and access to livestock watering points	M	M	Mod	Access to severed land on east of main alignment provided by retention of existing underpass on existing A90. Access to other severed fields from provision of new field access from Tipperty Access road. Reinstatement of boundary features along main alignment and along Tipperty Access. Provision of new access to fields from Tipperty	Mod

Land Interest	Description of Potential Impact	Sensitivity[86]	Magnitude [87]	Significance[88]	Description of Proposed Mitigation Measures	Significance of Residual Effect
					Access as required. Reinstatement of field drainage, tying in with road drainage scheme as appropriate. Provision of watering points for livestock as appropriate to ensure livestock have access to water in affected fields and in severed land AG1, AG2, AG3, AG4, AG5, AG6, AG7, AG8, AG9, AG10, AG11, AG12, AG13, AG14, AG15, AG16, AG17, AG18, AG19, AG24	

8 GEOLOGY AND SOILS

8.1 INTRODUCTION

This chapter considers the potential effects of the proposals on geological resources and soils. The project engineers have supplied all detailed geological and soils information.

8.2 SOURCES OF INFORMATION

The following sources of information have been used for this assessment:

- previous reports for the scheme (see Section 1.4);
- British Geological Survey (BGS) 1:50,000 scale Geological Map Sheet No 77 (solid and drift editions);
- soils and land use class (land capability for agriculture) information from the Macaulay Land Use Research Institute (MLURI);
- a geotechnical desk study by Grontmij[89] in February 1995;
- an Envirocheck Report[90] undertaken in October 2005;
- a geological assessment report prepared by British Geological Survey in 2006;
- consultations with SEPA,
- consultations with Aberdeenshire Council; and
- a factual report of a ground investigation survey carried out by Land Drill Geotechnics Ltd in August and September 2006 to inform the developing proposals.

8.3 CONSULTATIONS

- Information about designated geological sites, including geological sites of national importance, Sites of Special Scientific Interest (SSSIs)[91], and Regionally Important Geological Sites (RIGS)[92], was obtained from SNH; and
- information on the location of contaminated land from Aberdeenshire Council and SEPA .

8.4 BASELINE

8.4.1 Designations

Consultations have confirmed that there are no geological SSSIs or RIGs within the area which would be directly affected by the proposals. Balmedie Quarry SSSI lies approximately 1.75km west of the existing A90 at Balmedie. It is a disused quarry designated for its examples of well layered gabbros[93] during later tectonic events associated with the Caledonian orogeny[94].

[89] Formerly Carl Bro Group (CBG)
[90] Envirocheck Report on New Road Scheme north of Aberdeen prepared for CBG. Landmark Information Group, October, 2005
[91] An SSSI is an area that has been notified as being of special interest due to its flora, fauna or geological or physiographical features under the Wildlife and Countryside Act 1981 and the Nature Conservation (Scotland) Act, 2004
[92] Geological sites of regional importance, considered worthy of protection for their educational, research, historical or aesthetic importance
[93] A dark, coarse-grained, intrusive igneous rock chemically equivalent to basalt
[94] a period of mountain-building, during which rocks are formed

8.4.2 Geology

The scheme area is underlain by meta-sedimentary rocks of the Dalradian Super group. These are sedimentary[95] rocks which have been only slightly metamorphosed and thus retain the principal features of the primary material such as sedimentary bedding. Table 8.1 provides a more detailed summary of the geology of the area of the proposed scheme and this is illustrated on Figure 8.1.

Table 8.1: Geological Resources in the Study Area

Geological Formation	General Description	Rock Types	Location
Conglomerate (Devonian)	Sedimentary strata of the Lower Old Red Sandstone Group	Conglomerate, with subsidiary horizons of sandstone and clay	Southern part of the scheme area south of the Belhelvie fault
Aberdeen Formation (Dalradian)	Metamorphosed sandstones	Psammite, semipelite and subsidiary pelite with very sparse calc-silicate ribs	Southern half of the scheme area between approximately Belhelvie fault in the south to Aikenshill in the north
Ellon Formation (Dalradian)	Metamorphosed sandstones	Cordierite-bearing sheared and recrystallised psammite, semipelite and pelite with metamorphosed amphibolite bands	Northern half of the scheme area from Aikenshill in the south to Tipperty in the north
Intrusive Rocks (Permo Carboniferous)	Intrusive rocks	Dolerite and basalt dykes and indicated to be typically east-west trending and thin in width	Intrusions present north of Delfrigs and north of Westfield
Late and Post Tectonic (Exact Age unknown)	Part of the Belhelvie, Insch and Udny-Pitmeddan complexes	Gabbro, norite and peridotite	South and west of Balmedie
Pre and Syn Tectonic (Exact age unknown)	Metamorphic rocks	Metamorphosed amphibolite and hornblende-schist which was originally dykes and sheets	North of the site at Delfrigs and north of Foveran

8.4.3 Soils

The distribution of soils in the scheme area which would be affected by the proposals is shown on Figure 8.2.

The drift deposits mainly comprise glacial till which consists typically of firm to very stiff silty, sandy and gravely clays with numerous rock clasts of gravel to boulder size and irregular bands or lenses of sand and gravel. The thickness of drift deposits has been proved by the ground investigation surveys to vary locally across the area from 2.1 to 16m.

The changes in drift deposit thickness apparently correspond with the rolling topography of the scheme area. In general, the depth to rock head over most of the scheme is anticipated to be between 5 to 10m. However, locally it may exceed 15m such as near South Folds and in a few places rockhead may be found within 2 to 3m of the surface such as near Newtyle House and

[95] A rock formed from the accumulation and consolidation of sediment, usually in layered deposits

Fountainbleau. South of Balmedie, between Easter Hatton Landfill site and Wester Hatton cottages the Hatton Till is generally 1.5 to 4.0m thick but is often thinner on hill tops.

Areas of alluvium were identified adjacent to several watercourses that flow eastwards across the scheme corridor (see Section 9.5.1). The alluvium usually consists of poorly consolidated clays and silts, sands, gravel, and sometimes contains local deposits of peat.

Peat is identified locally on the geological map in the area near to Delfrigs and Newtyle House. These are accumulations of wet, acidic, partly decomposed vegetation blanketing upland areas and infilling basins.

Glacio-fluvial deposits are present locally across the length of the scheme in the form of ice contact deposits (sand and gravel) forming mounds and ridges, generally poorly sorted, with fragments of Dalradian metamorphic Caledonian igneous rocks and Palaeozoic and Mesozoic sedimentary rocks.

Glacio-lacustrine deposits are present locally in the south of the scheme around Balmedie as are silty clays and sand, red-brown in colour, laminated or massive with sparse shell fragments.

Over the majority of the scheme no significant deposits of made ground[96] were shown on the geological maps of the area, however significant deposits are expected to occur where former sand and gravel pits were present (such as to the south of Balmedie). These former pits are likely to have in excess of 5m of fill material which in some cases includes domestic waste where the quarries have been or are used as landfills. There may be small quantities of made ground which have not been documented throughout the scheme associated with historic and current development. Geological maps do not indicate made ground deposits near the proposed link routes to the south of Balmedie.

No indications of potential contamination have been identified in the exploratory holes during ground investigation.

8.5 ASSESSMENT METHODOLOGY

A qualitative appraisal of the likely effects of the development has been made taking account of potential impacts and agreed mitigation measures.

8.6 POTENTIAL IMPACTS

8.6.1 Permanent

Potential permanent impacts include:

- removal of in-situ material which may be used in embankments and as fill but whose stratigraphy will be damaged and its geological and soils value largely lost;
- burial of sites and materials of geological interest (including fossils) e.g. under embankments or permanent structures;
- loss of access to mineral and aggregate resources beneath permanent structures;

[96] Material placed or tipped, often as a result of previous industrial or mineral extraction activities

- exposure of geological formations e.g. in cuttings which may benefit geological study;
- physical damage of soils;
- damage to agricultural soils as a result of excavation, storage and re-spreading;
- local but minor changes to the ground water regime as a result of earthworks and carriageway drainage which could affect soils; and
- creation of new and possibly steeper slopes than natural slopes affecting drainage and aspect.

8.6.2 Construction

Potential construction impacts include:

- encountering of locally contaminated land; and
- pollution of soils from spills.

8.6.3 Operational

Potential operational impacts include:

- pollution of soils by spillages or spray from the road.

8.7 MITIGATION MEASURES

The following mitigation measures would be implemented:

G1. The contractor would be required to implement best practice measures to ensure disturbance to local geology and soils is reduced to the minimum necessary for the safe implementation of the works.
G2. Opportunities to create rock cuts of geological interest would be exploited where appropriate.
G3. Large glacial boulders uncovered by the works which were considered by the client environmental representative to be suitable for inclusion in landscaping works would be safeguarded and used.
G4. Scheme drainage measures would be designed to avoid erosion of any new or existing rock exposures and to avoid significant disturbance of local drainage patterns.
G5. All soils disturbed by the works would be handled, stored and re-spread following best practice to minimise adverse effects upon soil quality.
G6. The contractor would be required to produce a method statement identifying how best practice would be implemented to ensure soils were safeguarded.
G7. All fuel and other chemicals would be stored in accordance with best management practice within the site compounds. All oil and fuel storage facilities and small static plant would be well managed to minimise the risks of leaks to soil and groundwater.
G8. Plant and vehicles used for the construction works would be maintained on impermeable surfaces to contain oil spills.
G9. All earth bunds and soil storage areas would be well managed to minimise run-off and erosion.
G10. Soils removed as part of the earthworks to facilitate construction would be re-used in the final landforming of the road unless found to be unsuitable.
G11. Any contaminated ground that is encountered would be dealt with according to best practice and contained in the works or disposed of following best practice to a suitably licensed disposal facility.

8.8 ASSESSMENT OF RESIDUAL EFFECTS

8.8.1 Permanent

The site is not within an area which is designated for its geological interest and no locally important geological features, exposures or resources would be directly affected by the construction activities. No significant geological effects are therefore predicted. On the basis of work to date it is not anticipated that any significant rock exposures would be uncovered. If any were unexpectedly discovered these would be incorporated in the works whenever feasible.

There would be disturbance to soils and some may be buried in the earthworks for the site or disposed of off-site (see Section 3.2.7). Disturbance and loss would be reduced to the minimum necessary for the works and all best practice measures implemented to reduce impacts to the quality of the soil (see also Section 7.7).

Site drainage would be designed to reduce impacts to local drainage patterns and wherever possible new slopes would seek to mimic natural slopes to avoid impacts in the longer term. No particularly sensitive soils have been identified in the study area and with implementation of committed mitigation significant effects are not predicted.

8.8.2 Construction

It is not anticipated that any significant areas of contaminated ground would be encountered during construction based on studies to date (see Section 8.4.3). Should any previously unidentified contaminated material be encountered the contractor would be required to make provision for appropriate investigation of the material and its safe handling and if necessary its disposal to a suitably licensed site.

The contractor would be required to implement all best practice on site to ensure that the risk of pollution of soils was reduced to a minimum and no significant effects are considered likely.

8.8.3 Operational

There may be some minor impacts to soils at the edge of adjoining fields from salt spray off the road but effects are considered unlikely to be significant since a barrier would be created by the hard strips and verges at the edge of the road and associated planting.

8.9 SUMMARY

- No sites designated for their geological interests would be affected by the proposals.
- No geological resources of particular significance have been identified which would be affected by the works and no significant effects are predicted.
- No significant areas of contaminated land have been identified which could be affected by the works.
- Implementation of best management practices including good design of the works would ensure that any impacts to soils were minimised.

9 ROAD DRAINAGE AND THE WATER ENVIRONMENT

9.1 INTRODUCTION

This chapter describes the baseline aquatic environment, reviews mitigation measures developed for the scheme and reports residual effects on surface and groundwaters. The nature conservation interests of watercourses are included in Chapter 10. The locations of water features are shown on Figure 6.1a-e.

9.2 SOURCES OF INFORMATION

Information sources for the assessment have included:

- review of the previous Stage 2 and Stage 3 assessments;
- 1:25,000 OS map Ellon & Inverurie (Explorer 421);
- review of SEPA River Quality Classification (2005 Data) - Interactive Map, http://www.sepa.org.uk/rqc/map.asp;
- site visits by the project team;
- discussions with local landowners;
- information provided by the design engineers in the project team; and
- meetings with SEPA and other feedback from consultees.

9.3 CONSULTATIONS

Key issues raised by consultees included:

- the importance of the Ythan Estuary and the need to ensure that run-off is adequately treated before reaching the estuary (SNH, 2005);
- that there have not been any major flooding of the burns in the area in recent years (Aberdeenshire Council, 2005) ;
- flood assessments should be undertaken on the major burns to ensure additional run-off does not increase flood risks (Scottish Water, 2005).

9.4 STATUTORY FRAMEWORK

The Water Environment and Water Services (Scotland) Act 2003 (WEWS) implemented the Water Framework Directive[97] in Scotland and provided Ministers with the powers to make regulations to control activities which could affect the water environment. The Water Environment (Controlled Activities)(Scotland) Regulations 2005 (CAR) came into force on 1st April 2006. Regulation 4 of CAR defines the scope of SEPA's powers to authorise activities defined within section 20(3) of WEWS. This includes abstractions, impoundments, building and engineering works, and activities liable to cause pollution.

SEPA's powers under CAR are defined under section 20(1) of WEWS as for the purpose of "protecting the water environment". SEPA considers that the WFD and WEWS Regulations require a wider view of the water environment which should include protecting uses of water and mitigating the risks of flooding. WEWS requires the authorisation of building or engineering works (other than impoundments) that are carried out in:

- wetlands, rivers and lochs; or

[97] The Water Framework Directive 2000/60/EC

- in the vicinity of groundwater, wetlands, rivers and lochs and likely to have a significant adverse effect upon the water environment.

SEPA aims to focus proportionate controls over those aspects of building and engineering works which clearly pose an environmental risk. Controls would be applied over the engineering process as well as the indirect consequences which might follow on from the engineering works.

9.5 BASELINE

9.5.1 Baseline Features

The general drainage in the area is from west to east to the coastline. There are no major watercourses or water bodies in the area which would be directly affected by the proposals. The majority of watercourses in the area of the scheme are small burns which drain eastwards towards the coast. Burns from Foveran to the north drain into the River Ythan Estuary an SAC, SPA and Ramsar Site (see Section 9.5.3).

Running from south to north the road corridor would cross, or associated works could affect, the following burns:

- an unnamed field drain east of Hatton (NGR NJ 963 159) which outfalls north of Millden Links;
- Millden Burn (NGR NJ 963 162) (drainage from the Millden Link Road would tie into existing drainage which drains into the Millden Burn);
- an unnamed burn to the south of Balmedie (NGR NJ 963 170) which joins Millden Burn to outfall to the sea at Eigie Links south of Balmedie;
- the Eigie Burn98 (NGR NJ 964 177) which is culverted at Balmedie and outfalls to the sea east of Balmedie as the Little Eigie Burn;
- a tributary of the Eigie Burn (NGR NJ 963 178) which flows immediately north of Balmedie and outfalls to the sea at Eigie Links;
- an unnamed burn (NGR NJ 977 187) which flows into the Blairton Burn and outfalls to the sea at Blairton Links;
- the Blairton Burn (NGR NJ 965 134) which flows to the south of Orrock House and outfalls to the sea north of Blairton Links;
- four tributaries of the Menie Burn (NGR NJ 983 198) between Orrock House and Dambrae flow into the west of the Menie House estate and drain into the coast at Menie Links;
- the Sandend Burn (NGR NJ 984 219) which crosses the A90 north of Delfrigs and outfalls to the sea at Drums Links. The burn is 1.83km in length;
- an unnamed burn south of Kirkhill (NGR NJ 965 224);
- the Foveran Burn, a 5.11km burn which drains into the River Ythan east of Newburgh (NGR NJ 974 239);
- the Foveran Lade (NGR NJ 973 239);
- a tributary of the Foveran Burn (NGR NJ 975 241) that would require to be diverted slightly to accommodate the scheme;
- an unnamed burn at Pitmillan (NGR NJ 968 262) which flows into the Foveran Burn;

[98] The Eigie ,Menie and Blairton Burns etc are small burns and are not routinely monitored by SEPA and thus the SEPA Interactive River Quality Map does not have information on their length or quality

- the Tarty Burn at Tipperty (NGR NJ 966 266) which is 7.08km in total length and drains into the River Ythan Estuary north of Newburgh.

The only other surface water features which would be affected by the scheme are two ponds at Dambrae (NGR NJ 966 208) which were dug as part of an implemented Scottish Forestry Grant Scheme (see Sections 6.4 and 7.4 and Photograph 13). These are small and were established in 2004. The banks are clay and there is little marginal vegetation.

9.5.2 Private Abstractions

Figure 6.1a-e shows all known private borehole water abstractions in the scheme area. The majority of private abstractions are used by farmers for their farm activities with a few private abstractions also serving residential properties. One borehole, at Pitmillan, used for the farm, is in the vicinity of the proposed scheme.

9.5.3 Water Quality and Sensitivity

Review of information received in response to consultations indicates that SEPA[99] monitor water quality of a few watercourses in the scheme area. Information is available for the following watercourses:

- the Foveran Burn: monitoring from approximately 3km south of Tipperty indicates that the watercourse is River Quality A2 (good)100;
- the Tarty Burn passing through Tipperty is River Quality B101 (moderate);
- Sandend Burn tributary is A2.
- the River Ythan is river quality value of A2 or good quality where it enters its estuary. There is no data for the Ythan Estuary itself but the stretch of the Aberdeenshire coastline to which the road runs parallel has been given the coastal classification of B or good.102

The Ythan catchment is a designated Sensitive Area under the Urban Wastewater Treatment Directive[103] and a designated Surface Water Nitrate Vulnerable Zone under the Nitrates Directive[104].

The sensitivity of the burns discharging to the Ythan is high as the Ythan is designated for its international importance for nature conservation as a Ramsar Site, a Special Area of Conservation (SAC) and a Special Protection Area (SPA) (see Section 10.5.3).

SEPA has identified several diffuse and point sources of pollution into the burns in the scheme area. All point sources of pollution originate from sewage disposal activities. Diffuse sources are due to the growing of crops combined with livestock farming. All the watercourses in the scheme area are identified as having pollution sources and are considered to be reporting category 1b – at risk (probably)[105].

[99] Consultation response, 21.11.05
[100] Good quality as defined by SEPA, 2006
[101] Moderate quality as defined by SEPA, 2006
[102] Good coastal water quality is unpolluted but may contain traces of contaminants, have normal flora and fauna and are likely to meet quality standards no less stringent than the mandatory standards for EC Designated bathing waters
[103] Directive 91/271/EEC on Urban Waste Water Treatment
[104] The EC Nitrates Directive 91/676/EEC implemented in Scotland under The Designation of Nitrate Vulnerable Zones (Scotland) Regulations 2002
[105] The pressure and impact assessment carried out shows that there is a likelihood of that waterbody failing to meet the environmental objectives of the Water Framework Directive

There are twenty discharges into the Tarty Burn, seven into the Foveran Burn and seven into the Sandend Burn.

9.5.4 Hydrology and Hydrogeology

There are no Groundwater Protection Zones[106] in the study area. There are likely to be small amounts of groundwater in the drift deposits[107]. Water in the alluvial deposits is likely to be in hydraulic continuity with the rivers. Small, perched bodies of groundwater may occur within both mapped glacial sands and gravels and unmapped sand and gravel horizons within the till. Groundwater that was encountered within the boreholes and trial pits dug for ground investigation surveys for the proposals tended to drop after being struck indicating that there is probably not much hydrostatic pressure present within the drift deposits.

There are two areas of drift deposits identified on maps[108] as of potential hydrogeological significance. These are:

- an area of Quaternary sands and gravels north of Balmedie which is identified as a locally important aquifer (see Section 8.4). This is described as sand and gravel of glacio-fluvial origin. The yields from these deposits are variable depending on the thickness of deposits. The quality of the groundwater is also variable;

- an area of river alluvium along the course of the Foveran Burn. This is described as sand, silt and clay deposits which give very low yields. The ground water chemistry is variable but poor.

The solid deposits beneath the site are generally indicated either impermeable to ground water or offer little potential for groundwater. There is the chance of rare springs occurring near the surface, however these are normally of poor yield and water quality. Site investigation boreholes for the scheme indicated that water is typically struck in the drift deposits at between 3 to 5m below ground level.

The Groundwater Vulnerability Map of Scotland 1995 shows the proposed road scheme corridor to be underlain in various places by a moderately permeable aquifer which is described as fractured or potentially fractured rocks which do not have a high primary permeability or other formations of variable permeability, and also in various places by a non-permeable aquifer, (described as formations with negligible permeability that are generally regarded as containing insignificant quantities of groundwater).

The southern section of the corridor between Blackdog (south of the scheme) and the southern half of Balmedie is underlain by a moderately permeable aquifer. The middle section between the northern half of Balmedie and to the south of the Foveran Burn is underlain by a non-permeable aquifer. The northernmost section is mainly underlain by a non-permeable aquifer apart from areas of moderate permeability associated with the Foveran Burn.

[106] Areas defined where groundwater is extracted from boreholes or springs for public water supply
[107] Factual Report on Ground Investigation by Land-Drill Geotechnics Ltd, October 2006
[108] 1:50,000 scale Geological Sheet No.77, Drift, 2004
1:25,000 scale Geological Sheet NJ81/91, Drift, 2003; and
1:25,000 scale Geological Sheet NJ82/92, Drift, 2003

9.5.5 Current Drainage and Flooding

Existing surface run-off is gathered by a positive drainage system which is evident over the length of the existing A90. The surface water drainage between Balmedie and Tipperty is discharged into local outfalls via filter drains or a network of gullies and carrier pipes. Drainage along the existing sections of dual carriageway is primarily a system of filter drains.

Most of the area in the A90 corridor is agricultural land therefore drainage is relatively good at present. Small localised areas of flooding occur due to blockages within the land drain systems and poor draining soil.

Consultation with SEPA has indicated that flooding has been predicted to be likely at the two major burns near the scheme (the Foveran and Tarty Burns). From SEPA records 1:200 year flooding (0.5% probability) is predicted for both burns. In the most major incident this is predicted to rise to 4m downstream of the Mill of Foveran.

9.5.6 Fisheries

The River Ythan is a long established fishing river particularly for Atlantic salmon, sea trout and finnock. The River Ythan Fisheries Board has made considerable efforts to improve the fishing over a number of years including mink control and re-stocking the river, and this, together with the control of netting off the north east coast of Scotland, gives encouraging signs for fish in the estuary in the future[109]. No netting is permitted in the estuary.

9.6 ASSESSMENT METHODOLOGY

The appraisal of effects has been guided by DMRB Volume 11[110] HA 216/06 (May 2006). Following guidance in the Advice Note the following assessments have been completed:

- a simple and detailed assessment of the pollution impacts from routine run-off on surface waters (see Appendix 9.1);
- an assessment of the pollution impacts from routine run-off on ground waters (see Appendix 9.2);
- an assessment of pollution impacts from accidental spillages (see Appendix 9.3); and
- an assessment of flood impacts (see Appendix 9.4)

The requirements of The Water Environment (Controlled Activities) (Scotland) Regulations 2005 have been taken into account in the design for the scheme and its mitigation[111] (see Section 9.4).

9.6.1 Baseline Sensitivity

The characterisation of the baseline aquatic environment has involved the review of relevant data and identification of sensitivities (see Section 9.5). The

[109] http://www.ythan.co.uk/

[110] Department of Transport/Scottish Office Industry Department/Welsh Office/Department of the Environment for Northern Ireland (1993) Design Manual for Roads and Bridges, Volume 11: Environmental Assessment. HMSO. Department of Transport/Scottish Office Industry Department/Welsh Office/Department of the Environment for Northern Ireland (1994) First Amendment to Design Manual Volume 11. HMSO. The technical chapters of the DMRB have subsequently been updated and amended on a number of occasions

[111] The Water Environment (Controlled Activities) (Scotland) Regulations 2005

assessment of catchment sensitivities has been guided by the criteria presented in Table 9.1.

Table 9.1: Catchment Sensitivity Classification

Sensitivity Category	Sensitivity Criteria	
	Along Route and/or Access Roads	Downstream in Catchment
High Sensitivity	Protected site affected Wetland/watercourse habitat of particular ecological importance Directly affects a waterbody classed as 'at risk' by SEPA Highly vulnerable groundwater Significant peat deposits on sloping ground	Protected site immediately downstream/adjacent
Moderate Sensitivity	Wetland/watercourse habitats of some ecological importance Indirectly affects a waterbody classed as 'at risk' by SEPA Moderately vulnerable groundwater Significant peat deposits	Protected site further down catchment
Low Sensitivity	Low vulnerability groundwater Superficial peat deposits	
Not Sensitive	No aquatic habitats or watercourses present No significant groundwater present	

The criteria for sensitivity are approximately based on a hierarchy of factors relating to quality of the aquatic environment including international and national designations, water quality information, waterbody status from the WFD review work undertaken to date by SEPA, consultations, site visits and the professional judgement of the assessment team. The criteria have been used to guide the analysis of the sensitivity of the baseline hydrological, hydrogeological and water quality environment along the scheme.

9.6.2 Impact Prediction and Evaluation

The prediction and assessment of impacts on hydrology, hydrogeology and other aquatic resources has been undertaken using the guideline criteria for impact magnitudes set out in Table 9.2.

Table 9.2: Impact Magnitude

Impact Magnitude	Guideline Criteria
High	Total loss of, or alteration to, key features of the baseline resource such that post development characteristics or quality would be fundamentally and irreversibly changed e.g. watercourse realignment
Moderate	Loss of, or alteration to, key features of the baseline resource such that post development characteristics or quality would be partially changed e.g. instream permanent bridge works
Low	Small changes to the baseline resource, which are detectable but the underlying characteristics or quality of the baseline situation would be similar to pre-development conditions e.g. culverting of very small watercourses
Negligible	A very slight change from baseline conditions, which is barely distinguishable, and approximates to the 'no-change' situation e.g. short term compaction from plant movements

Using these criteria, a series of impacts have been predicted for the project.

The significance of the predicted impacts has been assessed in relation to the sensitivities of the baseline resource. A matrix of impact significance was developed to provide a consistent framework for evaluation of impacts, and is presented in Table 9.3. Guideline criteria for the various impact categories are included in Table 9.4.

Table 9.3: Impact Significance Matrix

Magnitude	Sensitivity			
	High	Moderate	Low	Not Sensitive
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Minor
Low	Moderate	Minor	Minor	None
Negligible	Minor	Minor	None	None

Table 9.4: Effect Significance Categories

Significance	Definition	Guideline Criteria
None	No detectable change to the environment	No impacts to drainage patterns, surface and groundwater quality or aquatic habitat
Minor	A small but detectable change to the environment	Localised changes in drainage patterns or groundwater flows, or changes resulting in minor and reversible impacts to surface and groundwater quality or aquatic habitats
Moderate	A larger, but non-material change to the environment	Changes in water quality or quantity affecting part of a catchment or groundwaters of moderate vulnerability, or changes resulting in loss of conservation value to aquatic habitats or designated areas
Major	A material change to the environment	Changes in water quality or quantity affecting widespread catchments or groundwater reserves of strategic significance, or changes resulting in substantial loss of conservation value to aquatic habitats and designations

For the purposes of this assessment, those effects identified as being ‘major’ or ‘moderate’ have been evaluated as ‘significant environmental impacts’ and therefore those which may have an adverse effect on the status of waterbodies.

The matrices used to guide the assessment have been applied with a degree of flexibility since the evaluation of impacts would always be subject to particular location-specific characteristics which need to be taken into account. Cumulative effects have been taken into account through prediction and evaluation of impacts at a catchment-wide level.

9.7 POTENTIAL IMPACTS

The potential for the following impacts has been considered:

9.7.1 Permanent

- Changes to surface water morphology through realignment, culverting etc of watercourses and alterations to the beds of watercourses and drains;

- changes to drainage characteristics, aquatic habitats and hydrology in the locality of the site through physical works;
- changes to the hydrogeology/hydrology of the area through physical works;
- impacts on surface water abstractions;
- impacts to existing discharges; and
- the potential for the scheme to affect flooding in the area.

9.7.2 Construction

- Discharge of construction drainage potentially contaminated with sediments or materials used on site (fuels, lubricants, hydraulic fluids, cement etc);
- impacts from dust deposition in existing water features;
- impacts from discharge of sewage and effluent from the site compound facilities;
- pollution from accidental spillages or discharges of fuels, oils, chemicals etc; and
- pollution from waste materials, dust etc from handling contaminated land on-site.

9.7.3 Operational

- Pollution of watercourses and groundwater from road run-off (fuel, oil, metals from vehicle wear and tear, rubber, de-icing etc);
- impacts from spills of fuel as a result of accident;
- release of polluted materials from maintenance activities such as cleaning gully pots; herbicides used to control plant growth on verges or the central reserves; and
- biological effects from pollution from pollution incidents.

9.8 MITIGATION MEASURES

Dr1 The contractor would be required to design the detailed drainage system in accordance with the DMRB, SEPA[112], CIRIA[113] and other best practice guidance and to meet all requirements of CAR.

Dr2 All detailed drainage proposals would be discussed and agreed with SEPA. Method statements for works in proximity to or on burns draining to the Ythan would also be discussed with SNH because of the importance of the estuary as a site designated for its European importance.

Dr3 The detailed drainage design would ensure that there is not an increased risk of flooding of areas in proximity to the works as a result of the scheme.

Dr4 All pipes, basins or filter drains would be isolated from existing surface and groundwaters using impermeable membranes in any locations where land is found to be contaminated.

Dr5 The detailed design would include appropriate SUDS measures including filter drains, detention ponds and swales (see Section 9.8.1).

Dr6 All detailed drainage measures would be designed to benefit nature conservation where this is practical and feasible taking account of the future maintenance requirements. The contractor would be required to follow best practice guidance.

Dr7 All existing crossed watercourses would be culverted or bridged at their current location to maintain the existing flow path. Culverts would be

[112] Current list of relevant guidance available at: SEPA website www.sepa.org.uk
[113] CIRIA, Control of Water Pollution from Linear Construction Projects, Technical guidance (C648)

provided under the road at each location and would be of adequate size for predicted flows and to minimise the risk of blockage.

Dr8 All surface water drainage from the new road works would pass though detention ponds before being discharged to watercourses (providing balancing and pollution benefits).

Dr9 Appropriate mitigation if necessary would be taken forward with the landowner to mitigate for the potential loss of the borehole at Pitmillan.

Dr10 Toolbox talks would be given to all site operatives about the importance of safeguarding water quality and in particular the quality of water discharging to the Ythan.

Dr11 The contractor would be required to identify and implement measures to prevent any sediment rich or polluted run-off or contaminated groundwater produced by the works, entering and polluting the local drainage system and water courses, and to adopt all specific measures identified in the contract requirements.

Dr12 The contractor would be required to develop contingency plans, emergency procedures and joint response plans which would be implemented in the case of accidental spillages during construction. These would be developed in compliance with all best practice guidance and would include a drainage catchment plan detailing the drainage system. This would be made available by the contractor to emergency services to aid in the event of a major spill.

Dr13 Sewage from construction compounds would either pass to a temporary septic tank which would be periodically emptied and removed for off-site disposal at a licensed sewage treatment facility, or would be temporarily connected to an existing sewer.

Dr14 During operation of the road, the maintenance contractors would be required to comply with current SEPA guidance and specifications to avoid the risk of pollution.

Dr15 All SUDS measures would be maintained by Transport Scotland contractors during the life of the road scheme.

9.8.1 Sustainable Urban Drainage Systems

Sustainable Urban Drainage System (SUDS[114]) measures for the A90 upgrade have been developed as an integral part of the design. These measures would provide settlement for suspended solids, some breakdown of pollutants by natural processes and will provide a hydrological balance to ensure that run-off is discharged evenly to the existing watercourses. In addition, flow retention features would regulate discharges to receiving watercourses, thus reducing the risk of flooding.

The SUDS measures which would be implemented are:

- filter drains at the edge of both carriageways;
- eight detention ponds and at least two swales provided at carriageway drainage outfall locations (see Section 3.2.2.8). These are listed in Table 9.5 and their location shown on Figures 3.1a-e; and
- detention ponds would have shut off valves in order to minimise the risk of any spillages to watercourses.

[114] Sustainable Urban Drainage Systems (SUDS) are drainage methods which are based on natural processes to achieve attenuation of run-off water quality and quantity. Guidance on SUDS systems is available from SEPA, CIRIA etc (see relevant web links)

Small stretches of existing roads drain into existing drainage systems.

Table 9.5: SUDS Measures

Pond Name	Location	Pond Land Take Area	Catchment	Outlet
Easter Hatton Pond	Easter Hatton Landfill Site Mainline Ch -2100	850m^2	Easter Hatton Link Ch.0 – Ch.450	Unnamed burn/field ditch
Balmedie Pond	Balmedie South Mainline Ch -1000	3120 m^2	Balmedie Junction & B977 Realignment Ch.0 to Ch.700	Tributary of Millden Burn
Dyce Road Pond	B977 Ch 1070	1330 m^2	B977 Realignment Ch 700 - End	Eigie Burn
South Orrock Pond	Mainline Ch 800	7830 m^2	A90 Realignment Ch 150 - End & Mainline Ch 510 - Ch 2730	Tributary of Blairton Burn
Dambrae Pond	Mainline Ch 2700	4000 m^2	Mainline Ch 2730 - Ch 3650	Tributary of Menie Burn
Kirkhill Swale	Mainline Ch 4350	-	Side road at Kirkhill Ch.0 - End	Tributary of Sandend Burn
Foveran Pond	Mainline Ch 6000	9540 m^2	Mainline Ch 3650 - Ch 7660 & Newburgh Road Junction	Foveran Burn
Pitmillan Pond	Mainline Ch 7400	2650 m^2	Tipperty Junction & Mainline Ch 7660 - Ch 8000	Tributary of Foveran Burn
Tarty Pond	Mainline Ch 8800	2880 m^2	Mainline Ch 8000 - Ch 8800	Tributary of Tarty Burn
Tarty Swale	Tipperty Access	-	Tipperty Access Ch.0 - End	Tributary of Tarty Burn

9.9 ASSESSMENT OF RESIDUAL EFFECTS

9.9.1 Permanent

9.9.1.1 Watercourse Characteristics, Hydrology[115] and Hydrogeology[116]

The permanent development of the road scheme has the potential to impact on the hydrological and hydrogeological regimes due to permanent changes in land drainage and changes to the potential for groundwater recharge. There would be an overall increase in the area of impermeable surface, which would generate an increase in the volume of surface run-off, particularly where the road has been constructed over fields and grassed surfaces. The detailed design of flow detention features (including all SUDS measures, filter drains, detention ponds etc), have been designed to control the predicted increase in run-off and would ensure that significant residual effects on the existing hydrology and hydrogeology are avoided. The assessment has indicated that there would be no effects on important habitats in the area from changes in the hydrology (see also 10.10.1).

The construction of the road scheme would alter the beds of some watercourses and field drains. The proposed mitigation, which includes either building culverts or bridge crossings to maintain the locations of existing flow paths, has been designed to ensure that the residual effects would be minor (not significant). A small tributary drainage ditch to the Foveran Burn, in the vicinity of Old Mill Croft, would need to be diverted for 80m into the nearby southern drainage ditch. The burn would need to be re-levelled and then culverted beneath the main line of the new road before continuing to flow eastwards to join Foveran Burn. The physical

[115] The science dealing with the occurrence, circulation, distribution, and properties of the waters of the earth and its atmosphere
[116] The science dealing with the occurrence and distribution of underground water

works would be kept to the minimum necessary to allow construction and would be undertaken in accordance with all best practice in order to ensure that residual effects are not significant. No habitats of particular nature conservation importance have been identified which would be affected (see Section 10.5). Otters pass through the area and checks would be made for any holts etc prior to any works being undertaken (see Section 10.10.3).

The contractor would be required to follow best practice guidance for all works in watercourses and in the detailed design of detention ponds. All opportunities would be taken to benefit nature conservation (see Section 10.10.1). Culverts would include otter ledges to facilitate passage (see Section 10.10.1) and lagoons would be designed to encourage local biodiversity.

9.9.1.2 Surface Water Abstractions

There are no surface water abstractions that would be affected by the proposed scheme.

9.9.1.3 Private Borehole Abstractions

There is one borehole, at Pitmillan that is in the vicinity of the proposed works and may be potentially lost to the scheme. Suitable mitigation, if necessary, would be taken forward in discussion with the farmer[117]. This could be construction of a new borehole or it could be connection to the mains with suitable compensation.

9.9.1.4 Existing Discharges

There would be no permanent residual adverse effects on any of the existing discharges to Sandend, Foveran or Tarty and Burns (see Section 9.5.3). The contractor would be required to ensure that all new works took account of any existing discharges which could be affected by the works and planned for any potential impacts in advance of work beginning on site.

9.9.1.5 Detention ponds

Permanent development of land would be required for the SUDS detention ponds for each of the major scheme outfalls. These would require relatively small areas (see Table 9.5) and no permanent significant adverse effect on local hydrology and drainage is predicted from these basins. The basins are designed to attenuate surface run off and discharge to the existing watercourses at a rate no greater than existing greenfield run-off rate. The basins are designed to allow them to potentially become dry during times of sustained dry weather.

9.9.1.6 Flooding

The appraisal of the effect on the proposals on flooding at Foveran (see Appendix 9.4) indicates that there would be no significant effects from construction of the scheme.

9.9.2 Construction

9.9.2.1 Hydrology, Hydrogeology and Water Quality

During site preparation and construction activities, the run-off characteristics of the road works sites would be altered by temporary mounding and earthworks

[117] Preliminary discussions have taken place but final mitigation has still to be agreed

activities. The resultant increase in slope gradient would increase the run-off coefficient from the area but this would be partially offset by the higher porosity and permeability of loosely mounded soil relative to soil *in situ*. A slight increase in run-off is predicted.

It is likely that there would be an increased loading of sediment (suspended solids from surface earthworks and excavation activities) mobilised during the temporary works and which could affect a number of the small watercourses and groundwater minor aquifers. The route of the scheme would cross a number of small burns, drainage ditches and field drains (see Section 9.5.1). The proposed mitigation (including early installation of cut-off drains, SUDS detention ponds etc) would provide sufficient mitigation to ensure that any deterioration in water quality is minor and temporary and residual effects are insignificant (see also Section 3.2.2.8). The contractor would be required to plan all works carefully and agree the proposed drainage design and mitigation with SEPA in advance of construction. In particular, detailed method statements of how potential pollution of the Ythan would be controlled would be required including contingency plans to be implemented in case of an accident (see below).

Pollutant sources and pollutants that may be present in construction site drainage include:

- suspended solids from surface earthworks;
- hydrocarbons, lubricants and other fluids from fuel stores and machinery;
- concrete liquors;
- construction wastes and domestic wastes (sanitary water, sewage); and
- mobilised pollutants from in situ contaminated land.

All run-off from the construction areas would be managed in accordance with SEPA best practice and the detention ponds would be constructed as soon as possible in the construction programme to provide attenuation of pollutants and sediments from site drainage. The proposed route does not pass through any known pockets of contaminated land but if any were encountered the contractor would be required to follow all best practice to mitigate any potential effects.

It is not known at this stage whether any groundwater pumping would be required during construction. This would be defined by the contractor and all best practice would be required to be followed in disposal of any pumped water. Design work to date has not indicated the need for any major dewatering which could significantly affect the hydrology of the area.

9.9.2.2 Sewage/Effluent from Site Compounds

Sewage from construction compounds would either pass to a temporary septic tank which would be periodically emptied and removed for off-site disposal at a licensed sewage treatment facility, or would be temporarily connected to an existing sewer. The method of disposal would be agreed between the contractor, SEPA and Scottish Water. No discharges of sewage or other domestic effluents from site compounds would be permitted to watercourses or surface water drains.

9.9.2.3 Accidental Spillages

Adherence to the Water Environment (Oil Storage) (Scotland) Regulations 2006[118] (see Section 9.4), together with SEPA best practice guidance on the storage of fuels, oils and chemicals and on the operational use of these substances during the construction works would reduce the risk of a pollutant spill occurring. As part of the environmental management regime for the proposed works planned emergency response procedures would be in place to prevent, contain or deal with spills and SEPA would be notified immediately.

9.9.2.4 Ythan Estuary SAC and SPA

Early in the development of the scheme proposals consultees noted the potential for pollution effects to the Ythan Estuary if drainage was not adequately treated and controlled during construction and during operation. Any pollution of burns and ditches which drain to the Foveran and Tarty Burns, which both drain to the Ythan Estuary (some 3km away), would be those which give rise to greatest risk. Mitigation has been designed to ensure that possible water quality impacts which could affect the qualifying features of the Ythan Estuary and jeopardise the conservation objectives (see Section 1.2.2 and Table 10.7) would not be significant. The mitigation described above and in measures DR8 to DR12 would ensure that all potentially contaminated run-off is contained and dealt with prior to discharge to any receiving watercourses. These measures would protect the conservation interests of the Ythan Estuary. All site staff would be briefed on the importance of the Ythan and of controlling pollution to its catchment and to all watercourses in the area. Toolbox talks would also cover contingency plans to be implemented in case of accident.

9.9.3 Operation

9.9.3.1 Pollution in Road Run-off

Pollutant sources and pollutants that may be present in road run-off and which have the potential to impact on water quality include:

- hydrocarbons, oils and chemicals from exhaust emissions and leaks introduced in liquid form and through atmospheric deposition;
- heavy metals from tyre and brake wear, corrosion of car bodies and parts and from exhaust emissions in solid and liquid form and through atmospheric deposition;
- sediments from atmospheric deposition;
- chemicals, minerals and sediments introduced through maintenance activities such as de-icing or the use of herbicides on roadside verges.

9.9.3.2 Hydrocarbons

Hydrocarbons have a high affinity for sediment and tend to settle out with the sediment fraction in detention ponds. In addition a percentage would be filtered out either by the filter drains (where used) or via the passage of run-off through vegetation (swales) and within other SUDS systems (detention ponds and similar SUDS systems have what is regarded as a good performance in removal capacity i.e. >60% for run-off hydrocarbons[119]). Hydrocarbons would also be

[118] The Water Environment (Oil Storage) (Scotland) Regulations, Scottish Statutory Instrument 2006 No. 133

[119] Department of Transport/Scottish Office Industry Department/Welsh Office/Department of the Environment for Northern Ireland (1993) Design Manual for Roads and Bridges, Volume 4: Geotechnics and Drainage. HMSO. Department of Transport/Scottish Office Industry, update May 2006

degraded by micro-organisms in the sediments within the detention ponds. The SUDS measures incorporated into the drainage design have been designed to have capacity to ensure hydrocarbons would be removed from the routine run-off prior to its release at the discharge points and thus no significant residual effects are predicted on the quality of receiving waters (see Table 9.7).

9.9.3.3 Heavy Metals

Lead

Lead concentrations in road run-off have fallen in recent years as the majority of vehicles now use unleaded fuels. The low solubility and low toxicity (of the predicted solid state) of the metal would not be expected to have a significant impact on the biological environment. Any lead that is present is likely to be removed during the filtering and settling out phases of the SUDS and would not be significant (see Table 9.7).

Zinc

Zinc (mainly from tyre and brake wear) can have potentially significant ecological impacts as it can be toxic in certain forms. This is particularly the case for waters of low pH (i.e. acidic) and with low calcium and hardness concentrations. Forms of zinc associated with particulates should be removed by the scheme's SUDS measures (sedimentation and filtration (see Table 9.7)). Soluble forms would remain within the discharge. The calculations carried out for the Detailed Assessment of Pollution Impacts from Routine Run-off (see Appendix 9.1) indicate that soluble zinc levels would be likely to be low, so no significant environmental effects are predicted to result from their release to any of the watercourses in the area of the proposed scheme.

Copper

Copper (mainly from brake wear) is potentially more soluble than zinc and in acid waters of low calcium and hardness concentrations can be toxic. It can form insoluble non-reactive complexes with humic and fulvic acids that are commonly found in peaty areas and soils. The calculations carried out in the Detailed Assessment of Pollution Impacts from Routine Run-off (see Appendix 9.1) indicate that soluble copper levels could reach concentrations that might pose a risk to receiving waters.

Table 9.6: Estimated Copper Concentrations in Watercourses Receiving Routine Road Run-off

Watercourse	Grid Reference	Estimated Stream Copper Concentration (ug l^{-1})	Copper EQS (ug l^{-1})	Does it Fail?
Unnamed tributary	NGR NJ 963 186	49.8	40.0	Yes
Tributary to Menie Burn	NGR NJ 965 207	56.4	40.0	Yes
Tributary to Foveran Burn	NGR NJ 977 251	49.1	40.0	Yes
Tributary of the Tarty Burn	NGR NJ 971 264	54.6	40.0	Yes

The assessment has been based on estimated upstream concentrations of copper (at half the EQS[120] figure i.e. half of 0.040 mg l^{-1} which is 0.020 mg l^{-1}) and estimated build-up rates rather than measured values for the road run-off. These upstream concentration estimates could be higher than the actual concentration which would inflate the calculated concentration in the receiving burn. The above calculated downstream concentrations of copper are only slightly above the EQS figure. It is likely that a significant proportion of the soluble copper would be removed by all run-off passing through the scheme SUDS measures (see Table 9.7). Copper would be absorbed either onto clay particles or by humic/fulvic acids in soil and peaty materials and also by vegetation. No significant effects are therefore predicted to result from copper concentrations in the run-off discharged to the aquatic environment.

Table 9.7: Treatment Systems Efficiency for Removing Certain Pollutants

Treatment System	Removal Efficiencies (%)					
	Zinc (Total)	Copper (Dissolved)	Iron	Lead	Suspended Solids	Hydro-carbons
Combined Filter Drains	70-80	10-30	80-90	80-90	80-90	70-90
Sedimentation Lagoon/ Settling Pond	60-80	20-30	90+	80-90	60-90	70-90
Swales/Grassed Ditches	70-90	50-70	90+	80-90	60-90	70-90

9.9.3.4 Effects of Fuel Spills

Pollution or large influxes of contaminated water may be caused by:

- a vehicular accident releasing a cargo of pollutant (oil, petrol, diesel, chemicals etc);
- an intentional dumping of pollutants (fly tipping);
- fire fighting water introduced after a fire brigade response to a vehicular fire or accident;
- large volumes of water following a storm event or snow melt.

The mitigation measures proposed for the scheme which include filter drains, detention ponds, and other SUDS would help to mitigate the impacts from extreme pollution events. Detention ponds would hold large volumes of run-off and contaminated water, allowing time for pollution response plans to move into action and resultant cleanup to take place. In addition, catchment drainage plans, contingency plans, emergency response procedures and joint response plans (involving other organisations that may be involved in the event of a spill) would be developed in accordance with SEPA guidance. These measures would further reduce the potential for any significant pollution of the River Ythan and its estuary from such events.

Accidental Spillage Pollution Impact Assessments are included in Appendix 9.3 and they indicate that no further pollution control measures would be required to reduce the spillage risk within any section of the scheme.

[120] Environmental Quality Standards are a set of requirements which must be fulfilled at a given time by a given environment or particular part of it as set out in EU legislation under the Council Directive 96/61/EC 1996 concerning IPPC

9.9.3.5 Effects of Pollutants on Groundwater

An appraisal has been undertaken of the effects of pollutants on groundwater (see Appendix 9.2). The assessment indicates that in this area there could be moderate risks of pollution of groundwater because of local aquifer characteristics in the vicinity of the detention ponds and swales. The Groundwater Vulnerability Map of Scotland indicates that the majority of the scheme is underlain by non-permeable aquifer, apart from south of Balmedie (see Section 9.5.4 above and Section 8.4). The contractor would design all drainage measures in accordance with best practice and to meet SEPA's requirements (see Dr1 and Dr2) and risks of pollution to groundwater would therefore be controlled.

9.9.3.6 Release of Polluted Materials from Maintenance Activities

The use of herbicides in controlling weeds on roadside verges and in central reservations has the potential to contaminate run-off. Also the cleaning out of gulley pots that can accumulate a variety of materials and the use of de-icing agents (sodium chloride and grit) can also contribute polluting substances. Transport Scotland's maintenance contractors are required to adhere to best practice including SEPA guidance, in the planning of operations and the choice of compounds used (e.g. preference given to biodegradable substances) and no significant effects are predicted to result to the receiving watercourses.

Sudden high levels of salinity (chloride) would adversely affect receiving watercourses but the SUDS measures and the dilution of run-off in detention ponds prior to discharge would mitigate any possible adverse impacts so no significant effects are predicted to result to the receiving watercourses.

9.9.3.7 Ythan Estuary SAC and SPA

As during construction (see Section 9.9.2.4), during the operational phase, there would be potential for water quality impacts on receiving watercourses which could result in contaminated run-off entering the Foveran or Tarty Burns, which discharge into the Ythan Estuary. The mitigation described has been planned to ensure that all potentially contaminated run-off would be contained and dealt with prior to discharge to any receiving watercourses. The role of SUDS, and in particular the filter drains and detention ponds would play an important role. Ongoing maintenance by Transport Scotland's maintenance contractors would ensure they continued to function efficiently. These measures would protect the conservation interests of the Ythan Estuary (see Section 9.5.3).

9.10 SUMMARY

9.10.1 Permanent

- No significant residual effects on, or changes to, the hydrological and hydrogeological environments within the proposed scheme corridor are predicted to occur as a result of the scheme, providing that the committed mitigation measures are implemented.

9.10.2 Construction

- Providing that SEPA guidance and best practice requirements are followed during construction and pollution prevention measures implemented (including for the storage and handling of hazardous materials, the management of site run-off, the management of site compounds and domestic sewage, waste disposal and site restoration) the construction of the

scheme is not predicted to result in significant adverse effects to the aquatic environment.

- Localised pumping of groundwater may be required during construction. There would be no requirement for major dewatering that would be significant to the overall hydrology of the area.
- The proposed works and drainage from the construction site are therefore not predicted to significantly affect water quality of receiving watercourses including the Ythan.

9.10.3 Operational

9.10.3.1 Routine Operation

- The outline design for the scheme has been developed in accordance with the requirements of SEPA and following best practice and SUDS guidance. Checks have been made of the effects of run-off and the calculations indicate potential impacts would not be significant. The contract would require that all detention ponds, filter drains and other SUDS systems were installed and maintained successfully and it is therefore not predicted that any significant adverse effects on surface water and groundwater quality would occur as a result of the routine operation of the scheme.

9.10.3.2 Accidents and Pollution Incidents

- The mitigation measures proposed for the schemes that include filter drains, detention ponds, and other SUDS measures would help to mitigate the impacts from extreme pollution events. The ponds would hold large volumes of run-off and contaminated water, allowing time for pollution response plans to move into action and resultant cleanup to take place. In addition, catchment drainage plans, contingency plans, emergency response procedures and joint response plans (involving other organisations that may be involved in the event of a spill) would be developed for the scheme in accordance with SEPA guidance.

APPENDIX 9.1

ASSESSMENT OF ROUTINE RUN-OFF

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

METHOD A: SIMPLE ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Calc By: T.Sinanidou **Calc Date:** 19/06/2007

Watercourse Unnamed burn/field ditch east of Millden NJ 96400 15892
Associated Pond: Easter Hatton Pond

1. 95%ile river flow (Q_{95})	0.001	$m^{3/}sec$	*SEPA*
2. Road Width	7.300	m	
3. Road length	450	m	
4. AADT	230	veh/day	*Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
5. Runoff coefficient	0.7		*HA 216/06 p.5/2*
6. Rainfall Depth	0.013	m	*HA 216/06 Figure A.1 p.AI/2*

References relate to the report Road Drainage and the Water Environment HA 216/06. Volume11 Section 3 Part 10

Road Area 3285.000 m^2

Runoff volume from highway, V_H 29.894 m^3

River flow daily volume, V_R 103.680 m^3

Dillution, D 3.468

From Figure A.2 it can be seen that detailed assessment is required, as the dilution is not above the minimum requirement level for impacts from routine runoff.

Checked By: A Kirk
Date: Jun-07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

METHOD B: DETAILED ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Watercourse Small stream at Millden Links at NJ 96400 15892
Associated Pond: Easter Hatton Pond

Calc By: T.Sinanidou **Calc Date:** 19/06/2007

A detailed Assessment of pollution impacts from routine runoff is required.

1. Drained Area	0.329	ha	
2. Hardness	<100	mg/l	
3. AADT	230	veh/day	*Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
4. Permitted EQS for copper	40	µg/l	*HA 216/06 Table 2.1*
5. Permitted EQS for zinc *if RE1 or RE2*	300	µg/l	*HA 216/06 Table 2.1*
6. Permitted EQS for zinc *if RE3 or RE4*	1000	µg/l	*HA 216/06 Table 2.1*
7. Built-up rate for soluble copper	0.4	kg/ha/yr	*HA 216/06 Table B.1*
8. Built-up rate for total zinc	2.0	kg/ha/yr	*HA 216/06 Table B.1*
9. Runoff volume from highway, V_H	29.894	m^3	*Method A: Simple Assessment*
10. River flow daily volume, V_R	103.680	m^3	*Method A: Simple Assessment*

References relate to the report Road Drainage and the water environment HA 216/06. Volume11 Section 3 Part 10

Upstream dissolved copper C_B (kg/m^3) 0.020 kg/m^3
See Worked Example 2 Annex II/3

M (for copper) 0.00180 kg

M (for zinc) 0.00900 kg

V_R+V_H 133.574 m^3

Downstream River Concentration for Copper C_R 28.99976 µg/l **OK**
Additional Pollution Control Measures are NOT needed

River Ecosystem Class RE1 or RE2

Upstream total zinc C_B (kg/m^3) 0.150 kg/m^3
See Worked Example 2 Annex II/3

Downstream River Concentration for Zinc C_R 183.81 µg/l **OK**
Additional Pollution Control Measures are NOT needed

River Ecosystem Class RE3 or RE4

Upstream total zinc C_B (kg/m^3) 0.500 kg/m^3
See Worked Example 2 Annex II/3

Downstream River Concentration for Zinc C_R 455.5 µg/l **OK**
Additional Pollution Control Measures are NOT needed

Checked By: A Kirk
Date: Jun-07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

METHOD A: SIMPLE ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Calc By: T.Sinanidou **Calc Date: 12/01/2007**

Watercourse 1.Tributary, Millden Burn, NGR 396290,817020
Associated Pond: Balmedie Pond

1. 95%ile river flow (Q_{95})	0.003	$m^{3/}sec$	*SEPA*
2. Road Width	18.600	m	
3. Road length	530	m	
4. AADT	23200	veh/day	*Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
5. Runoff coefficient	0.7		*HA 216/06 p.5/2*
6. Rainfall Depth	0.013	m	*HA 216/06 Figure A.1 p.AI/2*

References relate to the report Road Drainage and the water environment HA 216/06. Volume11 Section 3 Part 10

Road Area 9858.000 m^2

Runoff volume from highway, V_H 89.708 m^3

River flow daily volume, V_R 216.000 m^3

Dillution, D 2.408

From Figure A.2 it can be seen that detailed assessment is required, as the dilution is not above the minimum requirement level for impacts from routine runoff.

Checked By: A.Kirk
Date: 25.01.07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

METHOD B: DETAILED ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Watercourse 1.Tributary, Middlen Burn, NGR 396290,817020
Associated Pond: Balmedie Pond

Calc By: T.Sinanidou **Calc Date:** 12/01/2007

A detailed Assessment of pollution impacts from routine runoff is required.

1. Drained Area	0.986	ha	
2. Hardness	<100	mg/l	
3. AADT	23200	veh/day	*Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
4. Permitted EQS for copper	40	µg/l	*HA 216/06 Table 2.1*
5. Permitted EQS for zinc *if RE1 or RE2*	300	µg/l	*HA 216/06 Table 2.1*
6. Permitted EQS for zinc *if RE3 or RE4*	1000	µg/l	*HA 216/06 Table 2.1*
7. Built-up rate for soluble copper	0.4	kg/ha/yr	*HA 216/06 Table B.1*
8. Built-up rate for total zinc	2.0	kg/ha/yr	*HA 216/06 Table B.1*
9. Runoff volume from highway, V_H	89.708	m^3	*Method A: Simple Assessment*
10. River flow daily volume, V_R	216.000	m^3	*Method A: Simple Assessment*

References relate to the report Road Drainage and the water environment HA 216/06. Volume11 Section 3 Part 10

Upstream dissolved copper C_B (kg/m^3) 0.020 kg/m^3
See Worked Example 2 Annex II/3

M (for copper) 0.00540 kg

M (for zinc) 0.02701 kg

V_R+V_H 305.708 m^3

Downstream River Concentration for Copper C_R 31.80044 µg/l **OK**
Additional Pollution Control Measures are NOT needed

River Ecosystem Class RE1 or RE2

Upstream total zinc C_B (kg/m^3) 0.150 kg/m^3
See Worked Example 2 Annex II/3

Downstream River Concentration for Zinc C_R 194.33 µg/l **OK**
Additional Pollution Control Measures are NOT needed

River Ecosystem Class RE3 or RE4

Upstream total zinc C_B (kg/m^3) 0.500 kg/m^3
See Worked Example 2 Annex II/3

Downstream River Concentration for Zinc C_R 441.6 µg/l **OK**
Additional Pollution Control Measures are NOT needed

Checked By: A.Kirk
Date: 25.01.07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

METHOD A: SIMPLE ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Calc By: T.Sinanidou **Calc Date: 19/06/2007**

Watercourse Eigie Burn at NJ 95776 17890
Associated Pond: Dyce Road Pond

1. 95%ile river flow (Q_{95})	0.007	$m^{3/}sec$	*SEPA*
2. Road Width	9.000	m	
3. Road length	760	m	
4. AADT	4300	veh/day	*Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
5. Runoff coefficient	0.7		*HA 216/06 p.5/2*
6. Rainfall Depth	0.013	m	*HA 216/06 Figure A.1 p.AI/2*

References relate to the report Road Drainage and the Water Environment HA 216/06. Volume11 Section 3 Part 10

Road Area 6840.000 m^2

Runoff volume from highway, V_H 62.244 m^3

River flow daily volume, V_R 604.800 m^3

Dillution, D 9.717

From Figure A.2 it can be seen that detailed assessment is required, as the dilution is not above the minimum requirement level for impacts from routine runoff.

Checked By: A Kirk
Date: Jun-07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

METHOD B: DETAILED ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Watercourse Eigie Burn at NJ 95776 17890
Associated Pond: Dyce Road Pond

Calc By: T.Sinanidou **Calc Date:** 19/06/2007

A detailed Assessment of pollution impacts from routine runoff is required.

1. Drained Area	0.684	ha	
2. Hardness	<100	mg/l	
3. AADT	4300	veh/day	*Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
4. Permitted EQS for copper	40	µg/l	*HA 216/06 Table 2.1*
5. Permitted EQS for zinc *if RE1 or RE2*	300	µg/l	*HA 216/06 Table 2.1*
6. Permitted EQS for zinc *if RE3 or RE4*	1000	µg/l	*HA 216/06 Table 2.1*
7. Built-up rate for soluble copper	0.4	kg/ha/yr	*HA 216/06 Table B.1*
8. Built-up rate for total zinc	2.0	kg/ha/yr	*HA 216/06 Table B.1*
9. Runoff volume from highway, V_H	62.244	m^3	*Method A: Simple Assessment*
10. River flow daily volume, V_R	604.800	m^3	*Method A: Simple Assessment*

References relate to the report Road Drainage and the water environment HA 216/06. Volume11 Section 3 Part 10

Upstream dissolved copper C_B (kg/m^3) 0.020 kg/m^3
See Worked Example 2 Annex II/3

M (for copper) 0.00375 kg

M (for zinc) 0.01874 kg

V_R+V_H 667.044 m^3

Downstream River Concentration for Copper C_R 23.75247 µg/l **OK**
Additional Pollution Control Measures are NOT needed

River Ecosystem Class RE1 or RE2

Upstream total zinc C_B (kg/m^3) 0.150 kg/m^3
See Worked Example 2 Annex II/3

Downstream River Concentration for Zinc C_R 164.10 µg/l **OK**
Additional Pollution Control Measures are NOT needed

River Ecosystem Class RE3 or RE4

Upstream total zinc C_B (kg/m^3) 0.500 kg/m^3
See Worked Example 2 Annex II/3

Downstream River Concentration for Zinc C_R 481.4 µg/l **OK**
Additional Pollution Control Measures are NOT needed

Checked By: A Kirk
Date: 19.06.07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

METHOD A: SIMPLE ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Calc By: T.Sinanidou **Calc Date:** 12/01/2007

Watercourse 3.Tributary of Blairton Burn NGR 396390 818660
Associated Pond: South Orrock Pond

1. 95%ile river flow (Q_{95})	0.0015	m^3/sec	*SEPA*
2. Road Width	18.600	m	
3. Road length	2200.000	m	
4. AADT	23200	veh/day	*Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
5. Runoff coefficient	0.7		*HA 216/06 p.5/2*
6. Rainfall Depth	0.013	m	*HA 216/06 Figure A.1 p.AI/2*

References relate to the report Road Drainage and the water environment HA 216/06. Volume11 Section 3 Part 10

Road Area	40920.000	m^2
Runoff volume from highway, V_H	372.372	m^3
River flow daily volume, V_R	129.600	m^3
Dillution, D	0.348	

From Figure A.2 it can be seen that detailed assessment is required, as the dilution is not above the minimum requirement level for impacts from routine runoff.

Checked By: A.Kirk
Date: 25.01.07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

METHOD B: DETAILED ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Watercourse 3.Tributary of Blairton Burn NGR 396390 818660
Associated Pond: South Orrock Pond

Calc By: T.Sinanidou **Calc Date:** 12/01/2007

A detailed Assessment of pollution impacts from routine runoff is required.

1. Drained Area	4.092	ha	
2. Hardness	<100	mg/l	
3. AADT	23200	veh/day	*Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
4. Permitted EQS for copper	40	µg/l	*HA 216/06 Table 2.1*
5. Permitted EQS for zinc *if RE1 or RE2*	300	µg/l	*HA 216/06 Table 2.1*
6. Permitted EQS for zinc *if RE3 or RE4*	1000	µg/l	*HA 216/06 Table 2.1*
7. Built-up rate for soluble copper	0.4	kg/ha/yr	*HA 216/06 Table B.1*
8. Built-up rate for total zinc	2.0	kg/ha/yr	*HA 216/06 Table B.1*
9. Runoff volume from highway, V_H	372.372	m^3	*Method A: Simple Assessment*
10. River flow daily volume, V_R	129.600	m^3	*Method A: Simple Assessment*

References relate to the report Road Drainage and the water environment HA 216/06. Volume11 Section 3 Part 10

Upstream dissolved copper C_B (kg/m^3) 0.020 kg/m^3
See Worked Example 2 Annex II/3

M (for copper) 0.02242 kg

M (for zinc) 0.11211 kg

V_R+V_H 501.972 m^3

Downstream River Concentration for Copper C_R 49.8313 µg/l **FAIL**
Additional Pollution Control Measures ARE needed

River Ecosystem Class RE1 or RE2

Upstream total zinc C_B (kg/m^3) 0.150 kg/m^3
See Worked Example 2 Annex II/3

Downstream River Concentration for Zinc C_R 262.07 µg/l **OK**
Additional Pollution Control Measures are NOT needed

River Ecosystem Class RE3 or RE4

Upstream total zinc C_B (kg/m^3) 0.500 kg/m^3
See Worked Example 2 Annex II/3

Downstream River Concentration for Zinc C_R 352.4 µg/l **OK**
Additional Pollution Control Measures are NOT needed

Checked By: A.Kirk
Date: 25.01.07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

METHOD A: SIMPLE ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Calc By: T.Sinanidou **Calc Date:** 12/01/2007

Watercourse 7.Tributary, Menie Burn, NGR 396520 820700
Associated Pond: Dambrae Pond

1. 95%ile river flow (Q_{95})	0.0005	m^3/sec	*SEPA*
2. Road Width	18.600	m	
3. Road length	2450.000	m	
4. AADT	23200	veh/day	*Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
5. Runoff coefficient	0.7		*HA 216/06 p.5/2*
6. Rainfall Depth	0.013	m	*HA 216/06 Figure A.1 p.AI/2*

References relate to the report Road Drainage and the water environment HA 216/06. Volume11 Section 3 Part 10

Road Area 45570.000 m^2

Runoff volume from highway, V_H 414.687 m^3

River flow daily volume, V_R 43.200 m^3

Dillution, D 0.104

From Figure A.2 it can be seen that detailed assessment is required, as the dilution is not above the minimum requirement level for impacts from routine runoff.

Checked By: A.Kirk
Date: 25.01.07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

METHOD B: DETAILED ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Watercourse 7.Tributary, Menie Burn, NGR 396520 820700
Associated Pond: Dambrae Pond

Calc By: T.Sinanidou **Calc Date:** 12/01/2007

A detailed Assessment of pollution impacts from routine runoff is required.

1. Drained Area	4.557	ha	
2. Hardness	<100	mg/l	
3. AADT	23200	veh/day	*Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
4. Permitted EQS for copper	40	µg/l	*HA 216/06 Table 2.1*
5. Permitted EQS for zinc *if RE1 or RE2*	300	µg/l	*HA 216/06 Table 2.1*
6. Permitted EQS for zinc *if RE3 or RE4*	1000	µg/l	*HA 216/06 Table 2.1*
7. Built-up rate for soluble copper	0.4	kg/ha/yr	*HA 216/06 Table B.1*
8. Built-up rate for total zinc	2.0	kg/ha/yr	*HA 216/06 Table B.1*
9. Runoff volume from highway, V_H	414.687	m^3	*Method A: Simple Assessment*
10. River flow daily volume, V_R	43.200	m^3	*Method A: Simple Assessment*

References relate to the report Road Drainage and the Water environment HA 216/06. Volume11 Section 3 Part 10

Upstream dissolved copper C_B (kg/m^3) 0.020 kg/m^3
See Worked Example 2 Annex II/3

M (for copper) 0.02497 kg

M (for zinc) 0.12485 kg

V_R+V_H 457.887 m^3

Downstream River Concentration for Copper C_R 56.42 µg/l **FAIL**

Additional Pollution Control Measures ARE needed

River Ecosystem Class RE1 or RE2

Upstream total zinc C_B (kg/m^3) 0.150 kg/m^3
See Worked Example 2 Annex II/3

Downstream River Concentration for Zinc C_R 286.82 µg/l **OK**

Additional Pollution Control Measures are NOT needed

River Ecosystem Class RE3 or RE4

Upstream total zinc C_B (kg/m^3) 0.500 kg/m^3
See Worked Example 2 Annex II/3

Downstream River Concentration for Zinc C_R 319.8 µg/l **OK**

Additional Pollution Control Measures are NOT needed

Checked By: A.Kirk
Date: 25.01.07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

METHOD A: SIMPLE ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Calc By: T.Sinanidou **Calc Date: 30/01/2007**

Watercourse Foveran Burn
Associated Pond: Foveran Pond

1. 95%ile river flow (Q_{95})	0.084	m^3/sec	*SEPA*
2. Road Width	18.600	m	
3. Road length	3950	m	
4. AADT	23200	veh/day	*Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
5. Runoff coefficient	0.7		*HA 216/06 p.5/2*
6. Rainfall Depth	0.013	m	*HA 216/06 Figure A.1 p.AI/2*

References relate to the report Road Drainage and the water environment HA 216/06. Volume11 Section 3 Part 10

Road Area	73470.000	m^2
Runoff volume from highway, V_H	668.577	m^3
River flow daily volume, V_R	7257.600	m^3
Dillution, D	10.855	

From Figure A.2 it can be seen that detailed assessment is not required, as the dilution is above the minimum requirement level for impacts from routine runoff.

Checked By: A.Kirk
Date: 30.01.07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

METHOD A: SIMPLE ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Calc By: T.Sinanidou **Calc Date:** 12/01/2007

Watercourse 11.Tributary, Foveran Burn, NGR 397770 825150
Associated Pond: Pitmillan Pond

1. 95%ile river flow (Q_{95})	0.0003	m^3/sec	*SEPA*
2. Road Width	18.600	m	
3. Road length	400.000	m	
4. AADT	18800	veh/day	*Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
5. Runoff coefficient	0.7		*HA 216/06 p.5/2*
6. Rainfall Depth	0.013	m	*HA 216/06 Figure A.1 p.AI/2*

References relate to the report Road Drainage and the Water Environment HA 216/06. Volume11 Section 3 Part 10

Road Area 7440.000 m^2

Runoff volume from highway, V_H 67.704 m^3

River flow daily volume, V_R 25.920 m^3

Dillution, D 0.383

From Figure A.2 it can be seen that detailed assessment is required, as the dilution is not above the minimum requirement level for impacts from routine runoff.

Checked By: A.Kirk
Date: 25.01.07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

METHOD B: DETAILED ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Watercourse 11.Tributary, Foveran Burn, NGR 397770 825150
Associated Pond: Pitmillan Pond

Calc By: T.Sinanidou **Calc Date:** 12/01/2007

A detailed Assessment of pollution impacts from routine runoff is required.

1. Drained Area		0.744	ha	
2. Hardness		<100	mg/l	
3. AADT		18800	veh/day	*Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
4. Permitted EQS for copper		40	µg/l	*HA 216/06 Table 2.1*
5. Permitted EQS for zinc	*if RE1 or RE2*	300	µg/l	*HA 216/06 Table 2.1*
6. Permitted EQS for zinc	*if RE3 or RE4*	1000	µg/l	*HA 216/06 Table 2.1*
7. Built-up rate for soluble copper		0.4	kg/ha/yr	*HA 216/06 Table B.1*
8. Built-up rate for total zinc		2.0	kg/ha/yr	*HA 216/06 Table B.1*
9. Runoff volume from highway, V_H		67.704	m^3	*Method A: Simple Assessment*
10. River flow daily volume, V_R		25.920	m^3	*Method A: Simple Assessment*

References relate to the report Road Drainage and the water environment HA 216/06. Volume11 Section 3 Part 10

Upstream dissolved copper C_B (kg/m^3) 0.020 kg/m^3
See Worked Example 2 Annex II/3

M (for copper) 0.00408 kg

M (for zinc) 0.02038 kg

V_R+V_H 93.624 m^3

Downstream River Concentration for Copper C_R 49.08 µg/l **FAIL**
Additional Pollution Control Measures ARE needed

River Ecosystem Class RE1 or RE2

Upstream total zinc C_B (kg/m^3) 0.150 kg/m^3
See Worked Example 2 Annex II/3

Downstream River Concentration for Zinc C_R 259.25 µg/l **OK**
Additional Pollution Control Measures are NOT needed

River Ecosystem Class RE3 or RE4

Upstream total zinc C_B (kg/m^3) 0.500 kg/m^3
See Worked Example 2 Annex II/3

Downstream River Concentration for Zinc C_R 356.1 µg/l **OK**
Additional Pollution Control Measures are NOT needed

Checked By: A.Kirk
Date: 25.01.07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

METHOD A: SIMPLE ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Calc By: T.Sinanidou **Calc Date:** 30/01/2007

Watercourse Trib of Tarty Burn
Associated Pond: Tarty Pond

1. 95%ile river flow (Q_{95})	0.00025	$m^{3/}sec$	*SEPA*
2. Road Width	18.600	m	
3. Road length	790	m	
4. AADT	18800	veh/day	*Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
5. Runoff coefficient	0.7		*HA 216/06 p.5/2*
6. Rainfall Depth	0.013	m	*HA 216/06 Figure A.1 p.AI/2*

References relate to the report Road Drainage and the water environment HA 216/06. Volume11 Section 3 Part 10

Road Area 14694.000 m^2

Runoff volume from highway, V_H 133.715 m^3

River flow daily volume, V_R 21.600 m^3

Dillution, D 0.162

From Figure A.2 it can be seen that detailed assessment is required, as the dilution is not above the minimum requirement level for impacts from routine runoff.

Checked By: A.Kirk
Date: 30.01.07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

METHOD B: DETAILED ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Watercourse Trib of Tarty Burn
Associated Pond: Tarty Pond

Calc By: T.Sinanidou **Calc Date:** 30/01/2007

A detailed Assessment of pollution impacts from routine runoff is required.

1. Drained Area	1.469	ha	
2. Hardness	<100	mg/l	
3. AADT	18800	veh/day	*Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
4. Permitted EQS for copper	40	µg/l	*HA 216/06 Table 2.1*
5. Permitted EQS for zinc *if RE1 or RE2*	300	µg/l	*HA 216/06 Table 2.1*
6. Permitted EQS for zinc *if RE3 or RE4*	1000	µg/l	*HA 216/06 Table 2.1*
7. Built-up rate for soluble copper	0.4	kg/ha/yr	*HA 216/06 Table B.1*
8. Built-up rate for total zinc	2.0	kg/ha/yr	*HA 216/06 Table B.1*
9. Runoff volume from highway, V_H	133.715	m^3	*Method A: Simple Assessment*
10. River flow daily volume, V_R	21.600	m^3	*Method A: Simple Assessment*

References relate to the report Road Drainage and the water environment HA 216/06. Volume11 Section 3 Part 10

Upstream dissolved copper C_B (kg/m^3) 0.020 kg/m^3
See Worked Example 2 Annex II/3

M (for copper) 0.00805 kg

M (for zinc) 0.04026 kg

V_R+V_H 155.315 m^3

Downstream River Concentration for Copper C_R 54.62116 µg/l **FAIL**
Additional Pollution Control Measures ARE needed

River Ecosystem Class RE1 or RE2

Upstream total zinc C_B (kg/m^3) 0.150 kg/m^3
See Worked Example 2 Annex II/3

Downstream River Concentration for Zinc C_R 280.06 µg/l **OK**
Additional Pollution Control Measures are NOT needed

River Ecosystem Class RE3 or RE4

Upstream total zinc C_B (kg/m^3) 0.500 kg/m^3
See Worked Example 2 Annex II/3

Downstream River Concentration for Zinc C_R 328.7 µg/l **OK**
Additional Pollution Control Measures are NOT needed

Checked By: A.Kirk
Date: 25.01.07

APPENDIX 9.2

ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUN-OFF TO GROUNDWATERS

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

Method C: Assessment of Pollution Impacts from routine runoff to groundwaters

Road Drainage and the water environment HA 216/06. Volume11 Section 3 Part 10

Calc By: T.Sinanidou **Calc Date: 05/06/2007**

Note

The present assessment covers Balmedie Pond, Dambrae Pond, Foveran Burn Pond, South Orrock Pond and Tarty Pond. The risk score given represents the worst case scenario circumstances. All of these ponds are simultaneously assessed because they are characterised by the same properties

Data

1. Traffic Density	**23200**	*Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
2. Rainfall Volume	**816.3**	*www.metoffice.gov.uk - Rainfall Data at Craibstone Weather Station 1971-2000*
3. Rainfall Intensity	**<23mm/hr**	*Flood Estimation Handbook Volume 2 Figure11.6*
4. Depth to Water	**3 - 5 m**	
5. Flow Type	**Intergranular Flow**	*Report: A90 Balmedie to Tipperty, Geotechnical Certification,Preliminary Sources Study Report (Jan 2006)*
6. Effective Grain Size	**V coarse sand and above**	
7. Lithology	**<1% clay minerals**	

Property	Weighting Factor	Site Data (AADT)	Risk Score	Component Score
Traffic Density	15	23200	2	30
Rainfall Volume	15	816.3	2	30
Rainfall Intensity		Even <23mm		
Soakaway Geometry	15	Pond	2	30
Unsaturated zone (depth to water)	20	3 - 5 metres	3	60
Flow Type	20	Intergranular	1	20
Effective Grain Size	7.5	V coarse sand and above	3	22.5
Lithology	7.5	<1% clay minerals	3	22.5
OVERALL RISK SCORE				**215**

Overall Risk Score	<150	Low Risk of Impact
	150-250	Medium Risk of Impact
	>250	High Risk of Impact

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Checked By: H. Carlyle
Date: 20.06.07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

Method C: Assessment of Pollution Impacts from routine runoff to groundwaters

Road Drainage and the water environment HA 216/06. Volume11 Section 3 Part 10

Calc By: T.Sinanidou **Calc Date: 05/06/2007**

Easter Hatton Pond

Data

1. Traffic Density	**230**	*Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
2. Rainfall Volume	**816.3**	*www.metoffice.gov.uk - Rainfall Data at Craibstone Weather Station 1971-2000*
3. Rainfall Intensity	**<23mm/hr**	*Flood Estimation Handbook Volume 2 Figure11.6*
4. Depth to Water	**3 - 5 m**	
5. Flow Type	**Intergranular**	*Report: A90 Balmedie to Tipperty, Geotechnical Certification,Preliminary Sources Study Report (Jan 2006)*
6. Effective Grain Size	**V coarse sand and above**	
7. Lithology	**<1% clay minerals**	

Property	Weighting Factor	Site Data (AADT)	Risk Score	Component Score
Traffic Density	15	230	1	15
Rainfall Volume	15	816.3	2	30
Rainfall Intensity		Even <23mm		
Soakaway Geometry	15	Pond	2	30
Unsaturated zone (depth to water)	20	3 - 5 metres	3	60
Flow Type	20	Intergranular	1	20
Effective Grain Size	7.5	V coarse sand and above	3	22.5
Lithology	7.5	<1	3	22.5
OVERALL RISK SCORE				**200**

Overall Risk Score	<150	Low Risk of Impact
	150-250	Medium Risk of Impact
	>250	High Risk of Impact

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Checked By: H. Carlyle
Date: 20.06.07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

Method C: Assessment of Pollution Impacts from routine runoff to groundwaters

Road Drainage and the water environment HA 216/06. Volume11 Section 3 Part 10

Calc By: T.Sinanidou **Calc Date: 05/06/2007**

Dyce Road Pond

Data

1. Traffic Density	**4300**	*Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
2. Rainfall Volume	**816.3**	*www.metoffice.gov.uk - Rainfall Data at Craibstone Weather Station 1971-2000*
3. Rainfall Intensity	**<23mm/hr**	*Flood Estimation Handbook Volume 2 Figure11.6*
4. Depth to Water	**3 - 5 m**	
5. Flow Type	**Intergranular**	*Report: A90 Balmedie to Tipperty, Geotechnical Certification,Preliminary Sources Study Report (Jan 2006)*
6. Effective Grain Size	**V coarse sand and above**	
7. Lithology	**<1% clay minerals**	

Property	Weighting Factor	Site Data (AADT)	Risk Score	Component Score
Traffic Density	15	4300	1	15
Rainfall Volume	15	816.3	2	30
Rainfall Intensity		Even <23mm		
Soakaway Geometry	15	Pond	2	30
Unsaturated zone (depth to water)	20	3 - 5 metres	3	60
Flow Type	20	Intergranular	1	20
Effective Grain Size	7.5	V coarse sand and above	3	22.5
Lithology	7.5	<1	3	22.5
OVERALL RISK SCORE				**200**

Overall Risk Score	<150	Low Risk of Impact
	150-250	Medium Risk of Impact
	>250	High Risk of Impact

Road Drainage and the water environment HA 216/06. Volume11 Section 3 Part 10. Annex I page AI/9

Checked By: H. Carlyle
Date: 20.06.07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

Method C: Assessment of Pollution Impacts from routine runoff to groundwaters

Road Drainage and the water environment HA 216/06. Volume11 Section 3 Part 10

Calc By: T.Sinanidou **Calc Date: 05/06/2007**

Pitmillan Pond

Data

1. Traffic Density	**23200**	*Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
2. Rainfall Volume	**816.3**	*www.metoffice.gov.uk - Rainfall Data at Craibstone Weather Station 1971-2000*
3. Rainfall Intensity	**<23mm/hr**	*Flood Estimation Handbook Volume 2 Figure11.6*
4. Depth to Water	**3 - 5 m**	*Report: A90 Balmedie to Tipperty, Geotechnical Certification,Preliminary Sources Study Report (Jan 2006)*
5. Flow Type	**Fracture flow**	
6. Effective Grain Size	**Fine and Below**	
7. Lithology	**<1% clay minerals**	

Property	Weighting Factor	Site Data (AADT)	Risk Score	Component Score
Traffic Density	15	23200	2	30
Rainfall Volume	15	816.3	2	30
Rainfall Intensity		Even <23mm		
Soakaway Geometry	15	Pond	2	30
Unsaturated zone (depth to water)	20	3 - 5 metres	3	60
Flow Type	20	Fracture	3	60
Effective Grain Size	7.5	Fine and Below	1	7.5
Lithology	7.5	<1	3	22.5
OVERALL RISK SCORE				**240**

Overall Risk Score	<150	Low Risk of Impact
	150-250	Medium Risk of Impact
	>250	High Risk of Impact

Road Drainage and the water environment HA 216/06. Volume11 Section 3 Part 10. Annex I page AI/9

Checked By: H. Carlyle
Date: 20.06.07

APPENDIX 9.3

ASSESSMENT OF POLLUTION IMPACTS FROM ACCIDENTAL SPILLAGES

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

Method D Assessment of Pollution Impacts from accidental spillages

Watercourse Unnamed burn/field ditch east of Millden NJ 96400 15892
Associated Pond: Easter Hatton Pond

Calc By: A Kirk **Calc Date:** 06/06/2007

Assessement Method D is used assuming the receiving watercourse is RE1 or RE2 (worst case scenario)

Traffic Figures: *Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
SS : *DMRB Volume 11 Section 3 Part 10 HA 216/06 Table D.1*

	Road Length (km)	AADT (veh/day)	SS
Trunk Road - No junction	0.45	230	0.29

Percentage of HGV vehicles 11 *Report: A90 Balmedie to Tipperty, Local Model Validation and Forecasting Report*

P_{OL} 0.6 *DMRB - Volume 11 Section 3 Part 10 HA 216/06 Table D.2*

P_{OL} = *The propability, given an accident, that a serious pollution incident will result.*
P_{ACC} = *Annual Propability of an accidental spillage with the potential to cause serious pollution impact*
P_{INC} = *The propability, of a spillage accident with an associated risk of a serious pollution incident occuring*

P_{ACC} = Road Length x SS x (AADT x 365 x 10^{-9}) x (HGV/100) *DMRB - Volume 11 Section 3 Part 10 HA 216/06 page AI/11*

P_{ACC} = 0.000001
P_{INC} = 0.000001 = **0.00007** %

The propability of a spillage accident with an associated risk of serious pollution incident occuring is less than 1%
so spillage prevention is **not** required

Checked By: T.Sinanidou
Date: Jun-07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

Method D Assessment of Pollution Impacts from accidental spillages

Watercourse 1.Tributary, Middlen Burn, NGR 396290,817020
Associated Pond: Balmedie Pond

Calc By: A. Kirk **Date:** 26-01-07

Assessement Method D is used assuming the receiving watercourse is RE1 or RE2 (worst case scenario)

Traffic Figures: *Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
SS : *DMRB Volume 11 Section 3 Part 10 HA 216/06 Table D.1*

		Road Length (km)	AADT (veh/day)	SS
1	***Trunk Road - No junction***	0.17	23200	0.29
2	***Trunk Road - Slip Road***	0.40	23200	0.83
3	***Slip Road***	1.10	2500	0.83
4	***Slip Road at roundabout***	0.20	2500	3.09

Percentage of HGV vehicles 11 *Report: A90 Balmedie to Tipperty, Local Model Validation and Forecasting Report*

P_{OL} 0.6 *DMRB - Volume 11 Section 3 Part 10 HA 216/06 Table D.2*

P_{OL} = *The propability, given an accident, that a serious pollution incident will result.*
P_{ACC} = *Annual Propability of an accidental spillage with the potential to cause serious pollution impact*
P_{INC} = *The propability, of a spillage accident with an associated risk of a serious pollution incident occuring*

P_{ACC} = Road Length x SS x (AADT x 365 x 10^{-9}) x (HGV/100) *DMRB - Volume 11 Section 3 Part 10 HA 216/06 page AI/11*

	P_{ACC}
1	0.000046
2	0.00031
3	0.000092
4	0.000062

Total P_{ACC} = 0.00051

P_{INC} = 0.03 %

The propability of a spillage accident with an associated risk of serious pollution incident occuring is less than 1% so spillage prevention is not required

Checked By: T.Sinanidou
Date: Jun-07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

Method D Assessment of Pollution Impacts from accidental spillages

Watercourse Eigie Burn at NJ 95776 17890
Associated Pond: Dyce Road Pond

Calc By: T.Sinanidou **Calc Date:** 20/06/2007

Assessement Method D is used assuming the receiving watercourse is RE1 or RE2 (worst case scenario)

Traffic Figures: *Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
SS : *DMRB Volume 11 Section 3 Part 10 HA 216/06 Table D.1*

	Road Length (km)	AADT (veh/day)	SS
Trunk Road - No junction	0.76	4300	0.29

Percentage of HGV vehicles 10 *F:\4211\proj\P0000246600 A90 Balmedie Tippert\Traffic\PDF\HGV %*

P_{OL} 0.6 *DMRB - Volume 11 Section 3 Part 10 HA 216/06 Table D.2*

P_{OL} = *The propability, given an accident, that a serious pollution incident will result.*
P_{ACC} = *Annual Propability of an accidental spillage with the potential to cause serious pollution impact*
P_{INC} = *The propability, of a spillage accident with an associated risk of a serious pollution incident occuring*

P_{ACC} = Road Length x SS x (AADT x 365 x 10^{-9}) x (HGV/100) *DMRB - Volume 11 Section 3 Part 10 HA 216/06 page AI/11*

P_{ACC} = 0.000035
P_{INC} = 0.000021 = **0.00207** %

The propability of a spillage accident with an associated risk of serious pollution incident occuring is less than 1% so spillage prevention is **not** required

Checked By: T.Sinanidou
Date: Jun-07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

Method D Assessment of Pollution Impacts from accidental spillages

Watercourse 3.Tributary of Blairton Burn NGR 396390 818660
Associated Pond: South Orrock Pond

Calc By: A. Kirk **Calc Date:** 26/01/2007

Assessement Method D is used assuming the receiving watercourse is RE1 or RE2 (worst case scenario)

Traffic Figures: *Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
SS : *DMRB Volume 11 Section 3 Part 10 HA 216/06 Table D.1*

	Road Length (km)	AADT (veh/day)	SS
Trunk Road - No junction	2.17	23200	0.29

Percentage of HGV vehicles 11 *Report: A90 Balmedie to Tipperty, Local Model Validation and Forecasting Report*

P_{OL} 0.6 *DMRB - Volume 11 Section 3 Part 10 HA 216/06 Table D.2*

P_{OL} = *The propability, given an accident, that a serious pollution incident will result.*
P_{ACC} = *Annual Propability of an accidental spillage with the potential to cause serious pollution impact*
P_{INC} = *The propability, of a spillage accident with an associated risk of a serious pollution incident occuring*

P_{ACC} = Road Length x SS x (AADT x 365 x 10^{-9}) x (HGV/100) *DMRB - Volume 11 Section 3 Part 10 HA 216/06 page AI/11*

P_{ACC} = 0.000586
P_{INC} = 0.000352 = **0.035** %

The propability of a spillage accident with an associated risk of serious pollution incident occuring is less than 1% so spillage prevention is not required

Checked By: T.Sinanidou
Date: Jun-07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

Method D Assessment of Pollution Impacts from accidental spillages

Watercourse 7.Tributary, Menie Burn, NGR 396520 820700 - Dambrae Pond
Associated Pond: Dambrae Pond

Calc By: A. Kirk **Calc Date:** 26/01/2007

Assessement Method D is used assuming the receiving watercourse is RE1 or RE2 (worst case scenario)

Traffic Figures: *Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
SS : *DMRB Volume 11 Section 3 Part 10 HA 216/06 Table D.1*

	Road Length (km)	AADT (veh/day)	SS
Trunk Road - No junction	0.90	23200	0.29

Percentage of HGV vehicles 11 *Report: A90 Balmedie to Tipperty, Local Model Validation and Forecasting Report*

P_{OL} 0.6 *DMRB - Volume 11 Section 3 Part 10 HA 216/06 Table D.2*

P_{OL} = *The propability, given an accident, that a serious pollution incident will result.*
P_{ACC} = *Annual Propability of an accidental spillage with the potential to cause serious pollution impact*
P_{INC} = *The propability, of a spillage accident with an associated risk of a serious pollution incident occuring*

P_{ACC} = Road Length x SS x (AADT x 365 x 10^{-9}) x (HGV/100) *DMRB - Volume 11 Section 3 Part 10 HA 216/06 page AI/11*

P_{ACC} = 0.000244
P_{INC} = 0.000147 = **0.015** %

The propability of a spillage accident with an associated risk of serious pollution incident occuring is less than 1%
so spillage prevention is not required

Checked By: T.Sinanidou
Date: Jun-07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

Method D Assessment of Pollution Impacts from accidental spillages

Watercourse Foveran Burn
Associated Pond: Foveran Pond

Calc By: A. Kirk **Date:** 26-01-07

Assessement Method D is used assuming the receiving watercourse is RE1 or RE2 (worst case scenario)

Traffic Figures: *Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
SS : *DMRB Volume 11 Section 3 Part 10 HA 216/06 Table D.1*

		Road Length (km)	AADT (veh/day)	SS
1	***Trunk Road - No junction***	3.73	18800	0.29
2	***Trunk Road -Slip Road***	0.27	18800	0.83
3	***Slip Road***	0.65	2300	0.83
4	***Slip Road at Crossroad***	0.20	2300	0.88

Percentage of HGV vehicles 11 *Report: A90 Balmedie to Tipperty, Local Model Validation and Forecasting Report*

P_{OL} 0.6 *DMRB - Volume 11 Section 3 Part 10 HA 216/06 Table D.2*

P_{OL} = *The propability, given an accident, that a serious pollution incident will result.*
P_{ACC} = *Annual Propability of an accidental spillage with the potential to cause serious pollution impact*
P_{INC} = *The propability, of a spillage accident with an associated risk of a serious pollution incident occuring*

P_{ACC} = Road Length x SS x (AADT x 365 x 10^{-9}) x (HGV/100) *DMRB - Volume 11 Section 3 Part 10 HA 216/06 page AI/11*

	P_{ACC}
1	0.000816
2	0.00017
3	0.000050
4	0.000016

Total P_{ACC} = 0.0011

P_{INC} = 0.06 %

The propability of a spillage accident with an associated risk of serious pollution incident occuring is less than 1% so spillage prevention is not required

Checked By: T.Sinanidou
Date: Jun-07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

Method D Assessment of Pollution Impacts from accidental spillages

Watercourse 11.Tributary, Foveran Burn, NGR 397770 825150
Associated Pond: Pitmillan Pond

Calc By: A. Kirk

Assessement Method D is used assuming the receiving watercourse is RE1 or RE2 (worst case scenario)

Traffic Figures: *Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
SS : *DMRB Volume 11 Section 3 Part 10 HA 216/06 Table D.1*

		Road Length (km)	AADT (veh/day)	SS
1	*Trunk Road - No junction*	0.25	18800	0.29
2	*Trunk Road -Junction (SR)*	0.10	18800	0.83
3	*Slip Road*	0.50	1300	0.83
4	*Roundabout*	0.10	1200	3.09
5	*Cross Road*	0.10	1300	0.88
	Percentage of HGV vehicles	11	*Report: A90 Balmedie to Tipperty, Local Model Validation and Forecasting Report*	

P_{OL} 0.6 *DMRB - Volume 11 Section 3 Part 10 HA 216/06 Table D.2*

P_{OL} = *The propability, given an accident, that a serious pollution incident will result.*
P_{ACC} = *Annual Propability of an accidental spillage with the potential to cause serious pollution impact*
P_{INC} = *The propability, of a spillage accident with an associated risk of a serious pollution incident occuring*

P_{ACC} = Road Length x SS x (AADT x 365 x 10^{-9}) x (HGV/100) *DMRB - Volume 11 Section 3 Part 10 HA 216/06 page AI/11*

	P_{ACC}
1	0.000055
2	0.00006
3	0.000022
4	0.000015
5	0.000005

Total P_{ACC} = 0.00016

P_{INC} = 0.01 %

The propability of a spillage accident with an associated risk of serious pollution incident occuring is less than 1% so spillage prevention is not required

Checked By: T.Sinanidou
Date: Jun-07

Job No: P246600
Job Name: A90 Balmedie Tipperty Dualling

Method D Assessment of Pollution Impacts from accidental spillages

Watercourse Trib of Tarty Burn
Associated Pond: Tarty Pond

Calc By: A. Kirk **Calc Date: 26/01/2007**

Assessement Method D is used assuming the receiving watercourse is RE1 or RE2 (worst case scenario)

Traffic Figures: *Report: A90 Balmedie to Tipperty, Stage 2 Addendum, Fig 6.4*
SS : *DMRB Volume 11 Section 3 Part 10 HA 216/06 Table D.1*

	Road	Length (km)	AADT (veh/day)	SS
1	*Trunk Road - No junction*	0.50	18800	0.29
2	*Trunk Road -Slip Road*	0.30	18800	0.83
3	*Slip Road*	0.40	1300	0.83

Percentage of HGV vehicles 11 *Report: A90 Balmedie to Tipperty, Local Model Validation and Forecasting Report*

P_{OL} 0.6 *DMRB - Volume 11 Section 3 Part 10 HA 216/06 Table D.2*

P_{OL} = *The propability, given an accident, that a serious pollution incident will result.*
P_{ACC} = *Annual Propability of an accidental spillage with the potential to cause serious pollution impact*
P_{INC} = *The propability, of a spillage accident with an associated risk of a serious pollution incident occuring*

P_{ACC} = Road Length x SS x (AADT x 365 x 10^{-9}) x (HGV/100) *DMRB - Volume 11 Section 3 Part 10 HA 216/06 page AI/11*

	P_{ACC}
1	0.000109
2	0.00019
3	0.000017

Total P_{ACC} = 0.0003

P_{INC} = 0.02 %

The propability of a spillage accident with an associated risk of serious pollution incident occuring is less than 1% so spillage prevention is not required

Checked By: T.Sinanidou
Date: Jun-07

APPENDIX 9.4

FLOOD RISK ASSESSMENT

TRANSPORT
SCOTLAND

A90 Dualling Balmedie-Tipperty

Foveran Burn
Flood Risk Assessment

June 2007

Prepared for:

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B	01/06/07	M Megaughin	Christo Steyn	G Angus	For Audit
C	29/06/07	M Megaughin	Christo Steyn	C Gerry	Final

EXECUTIVE SUMMARY

Grontmij Group were commissioned by TRANSPORT SCOTLAND to carry out a Flood Risk Assessment on the Foveran Burn. The work was in connection with the proposed new alignment of the A90 trunk road which crosses the Foveran Burn, at Foveran, Aberdeenshire. The Flood Risk Assessment assesses the potential for the proposals to impact upon water levels within the Foveran Burn and informs the design process to ensure that the proposals are not at risk of inundation themselves.

It is proposed to construct the realigned A90 across the valley in which the Foveran Burn flows. The road would be carried over the valley on an embankment, with a culvert being installed to allow the Foveran Burn to flow through the embankment.

The hydrology of the catchment was estimated using the FEH statistical method for ungauged catchments which estimated flows of 23.3 m^3/s and 20.2 m^3/s for the 0.5% AEP and 1% AEP events respectively. These figures include an allowance of 20% for the potential impacts of climate change.

The flows were passed through a hydraulic model of the Foveran Burn, constructed using surveyed cross-sections of the watercourse. This provided estimated water levels within the watercourse. The model was then adapted to include the proposals and water levels were again estimated.

The analysis demonstrated that upstream of the current embankment and downstream of the proposed embankment there is no significant change to predicted water levels. In the small parcel of land between the two embankments there is an increase in the depth of water and extent of the inundation envelope. This is as a result of the proposed embankment displacing a volume of flood storage on the floodplain, the effect of which is to raise peak water levels by a maximum of 0.11m within the small land parcel during a 0.5% AEP event (including an allowance for climate change).

It is recommended that the parcel of land between the two embankments (**Appendix A – P246600/GLA/106**) should be assigned as an area for 'compensatory storage'. It is also recommended that the culvert through the proposed embankment be of minimum dimensions 4.2m (w) x 3.0 m (h). These dimensions will allow the culvert to pass peak flows whilst maintaining a minimum freeboard of 600mm (DRMB 4.2, HA107/04).

Given the mitigation measures above it is considered that no adverse impacts will occur on the Foveran Burn and that the proposals themselves will not be at risk of inundation.

1.0 INTRODUCTION

1.1 General

This document is written in support of the Environmental Statement required for the dualling of the A90 trunk road between Balmedie and Tipperty. Specifically, this document relates to the potential of the new road alignment to impact upon the flow regime within the Foveran Burn, and to ensure that water levels within the watercourse do not inundate the proposed road. A summary of this document is included within the Environmental Statement.

1.2 Scope of works

This document considers the Foveran Burn And assesses the potential for the watercourse to inundate the proposed road and the potential of the construction of the road to impact on water levels within the watercourse. This document does not consider the implications for the scheme of the Water Environment (Controlled Activities) (Scotland) Regulations 2005 (as amended), these are considered elsewhere. The following stages have been undertaken within this report:

i. Define project scope (Section 2)
ii. Commission topographic survey of watercourse
iii. Derivation of hydrology (Section 4)
iv. Construction of hydraulic model (Section 5)
v. Establishment of baseline conditions (Sections 3 & 4)
vi. Determination of any impacts as a result of proposals (Section 5.6)
vii. Consideration of mitigation measures (if required)

2.0 SETTING

2.1 Site location & topology

For the purpose of this document `*the site*` refers to the section of valley through which the Foveran Burn flows to the east and west of the current A90 at Foveran (**Appendix C – P246600/GLA/100**). The site is located on the Foveran Burn, to the east of Foveran, Aberdeenshire. The current A90 runs north – south immediately to the east of the village. To the west of the village the watercourse runs through the base of a flat bottomed valley with steeply sloping sides. The valley is blocked by an embankment just downstream of the village which carries the current A90 alignment, the watercourse runs through the embankment by way of a culvert (**Appendix B – Photograph 1**). This embankment blocks the valley to the level of the surrounding land. To the east of the current A90 embankment the valley continues for approximately 1km before opening out to the same level as the surrounding land.

2.2 Policy framework

The development proposal requires to be considered against national planning guidelines as outlined in SPP7 Planning and Flooding and its associated Planning Advice Note, PAN 69 and Development Plan documents. Current legislation and guidance at a national, regional and local level have been reviewed, the main points are summarised below.

2.2.1 National

The following pieces of national legislation and guidance are pertinent to the proposals:

2.2.1.1 SEPA Policy No. 41

SEPA's, *Policy no. 41, A Planning Authority Protocol Development at Risk of Flooding: Advice and Consultation* outlines the statutory roles of both SEPA and the Planning Authorities and provides a framework for consultation and advice. SEPA's remit in this respect is the statutory duty set out in the Environment Act 1995. Section 25 (2) of the Environment Act 1995, gives SEPA a duty, if requested by a planning authority to do so, to provide that authority with advice, on the basis of such information as it holds, as to the risk of flooding in any part of the authority's area. However, SEPA's Policy No.41 makes it clear that in cases where SEPA becomes aware of a flood risk even if the planning authority did not specifically request flooding comments it will inform them of any risk of flooding.

2.2.1.2 Scottish Planning Policy 7 – Planning & Flooding

This document provides the framework within which development proposals are assessed in terms of their vulnerability to, and potential to cause, flooding. The document details the framework for local authority responses to planning applications in which there is a risk of flooding posed to, or by, a proposed development. The general principles of the document are laid out in Paragraph 15, which states that; *"developers and planning authorities must give consideration to the possibility of flooding from all sources"* and that *"new development should be free from significant flood risk and not materially increase the probability of flooding elsewhere".* The risk framework (SPP7, p10, reproduced overleaf) provides the planning response to development in the floodplain including the appropriate level of flood protection that should be afforded to the site. Paragraphs 44 to 50 outline how flood risk should be considered in planning applications.

- Areas of little or no risk (<0.1% probability or 1 in 1000): no constraints
- Areas of low to medium risk (>0.1% probability or 1 in 1000, <0.5% or 1 in 200): acceptable for most forms of development
- Areas of medium to high risk (>0.5% probability or 1 in 200): acceptable for brownfield development provided adequate flood defences are available, unacceptable for development of previously undeveloped areas.

Planning Advice Note 69: Planning and Building Standards Advice on Flooding has been produced to support SPP7 and provides good practice advice.

2.2.1.3 Town & Country Planning (Scotland) Act 1997

Section 25 of the Town and Country Planning (Scotland) Act 1997 states that all applications must be determined in accordance with Development Plans unless material considerations indicate otherwise. The Development Plan for this area encompasses the Aberdeen and Aberdeenshire Structure Plan and the Aberdeenshire Local Plan, as discussed below.

2.2.2 Regional

The regional element of the Development Plan covering the site is North East Scotland Together: Aberdeen & Aberdeenshire Structure Plan 2001 – 2016. This document sets out strategic planning policy on flooding and the following policy is particularly relevant.

POLICY 22
Water Management

Local authorities in the North East will work with Scottish Environment Protection Agency, North of Scotland Water Authority and other appropriate agencies in identifying: . areas of flood risk and will consider amending the SP if the areas identified affects strategic development allocations; . management regimes aimed at reducing or managing flooding in existing developments; . proposals for new flood protection schemes if necessary; and . proposals for sustainable water management to enhance water quality, biodiversity and access. Development shall be directed away from areas at significant risk from flooding according to the sensitivity of the development and the risk of flooding of the site. Functional flood plains should be allowed to flood naturally where appropriate. Local plans shall identify areas at risk wherever possible and set appropriate criteria. Development shall also be sited and designed to protect the natural heritage value and water quality of lochs, ponds, watercourses, aquifers and wetland within the context of water course management. Developers shall deal with surface water treatment in a sustainable manner and in ways that avoid flooding and pollution. They shall also be required to provide Flood Risk Assessments for their proposals in appropriate cases.

2.2.3 Local

With regard to the local element of the Development Plan the relevant document is the Aberdeenshire Local Plan, 2002 which contains the following relevant policies.

Policy 15
Aquatic Engineering Works

Engineering works that would result in the deterioration of the ecological status or potential of a river, wetland, standing, tidal or coastal water or prejudice the ability to restore such water bodies to good ecological status, through impacts on water quality, quantity or flow rate, riparian habitat or protected species, will be refused.

Policy 16
Water Catchment Areas

Development that would generate discharges or other impacts, which would have an adverse effect on the water quality, quantity, flow rate, ecological status, riparian habitat, protected species or flood plains of water bodies including their catchment areas, will be refused, unless the development meets the criteria set out in Policies Env\1, Env\2, Env\3 and Env\4 (International, National and Other Recognised Nature Conservation Sites and Biodiversity).

2.4 Consultations

Consultations were held with SEPA and Aberdeenshire Council regarding the scope of a Flood Risk Assessment and to gather any supporting information on the Foveran Burn.

2.4.1 Aberdeenshire Council

The council (Flood Prevention Officer, Scott McBride) held no information on the Foveran Burn at the location of the site but given the current agricultural nature of the site this is not unexpected. Flooding was noted, however, at the lower extent of the Foveran Burn where it flows into the River Ythan, approximately 4.1km from the site. The River Ythan is tidally affected at this point which causes the Foveran Burn to back up during high tidal levels. This has historically flooded a number of properties in the village of Newburgh which sits at the confluence of the Foveran Burn and the River Ythan.

2.4.2 Scottish Environmental Protection Agency

SEPA (Nicholas Bedding) confirmed that the watercourse is not gauged and that no flow data is available. SEPA also confirmed that the site lies, in part, within the 0.5% AEP inundation area as shown within the Indicative River and Coastal Flood Map (Scotland). As discussed in subsequent sections SEPA (Martin Boshoff) was also contacted to discuss the outcome of the hydrological assessment.

3.0 PROPOSAL

3.1 Details of proposal

It is proposed to upgrade the current A90 single carriageway between Balmedie and Tipperty with a new section of dual carriageway. The new road alignment crosses the Foveran Burn approximately 200m east of the current crossing. The Foveran Burn lies in a flat bottomed valley with steeply sloping sides. The valley base is approximately 60 m in width. The proposed new alignment requires that the new road cross the valley on a new embankment and that a new culvert be installed to allow the Foveran Burn to flow through the embankment (**Appendix C - P246600/GLA/101**). It is recognised that the engineering works associated with such a culvert may require authorisation from SEPA under The Water Environment (Controlled Activities) (Scotland) Regulations 2005 and this will be sought separately, should it be deemed necessary.

As the proposals for the crossing are at an early stage the crossing design has not been confirmed. In order that the assessment may proceed our assumptions on the scenario to be evaluated are as follows:

- Initial culvert size of 4.2m x 3.0m
- Inlet and exit wingwalls have been assumed at an angle of 15° to allow an estimation of inlet losses, any significant change from this assumption through the design / construction process would require reanalysis of results.
- The existing embankment will be retained.

4.0 HYDROLOGY

4.1 Catchment characteristics

The Foveran Burn drains a catchment of approximately 32 km^2 to the point of the study site. The watercourse rises to the south-west of Foveran and flows north-east to join the River Ythan at Newburgh, about 4.7km to the north-east of the proposed road alignment at Foveran. The catchment is ungauged and the primary land use is agricultural.

The existing A90 road embankment creates a constriction to high flows within the Foveran Burn within the study area, where the Foveran Burn lies in a flat bottomed valley with steeply sloping sides. The valley base is approximately 60m in width.

Catchment parameters were obtained from the FEH CD-ROM Version 2. At the point at which the proposed road crosses the Foveran Burn (E397350 N823850), the mean altitude of the catchment is 79m AOD (**Appendix C - P346600/GLA/102**); the longest drainage path is 79km and the catchment has a standard annual average rainfall (SAAR) of 797mm. These parameters are shown in **Table I, Appendix A**.

4.2 Estimation of flows

A range of methodologies are available for estimating flood flows of varying probabilities. For catchments such as that of the Foveran Burn the Design Manual for Roads and Bridges (Vol 11, Sec 3, Part 10, HA216/06) (DMRB) recommends the use of two methodologies:

1) FEH statistical method
2) Revitalised FSR/FEH rainfall runoff method (ReFEH)

The manual suggests that method 2 (as above) should be used as a replacement for the FSR rainfall runoff method, as restated in the Flood Estimation Handbook, 1999, as it represents an improvement to the method. However, the methodology on which the ReFEH calculation is based has only been calibrated to a maximum Annual Event Probability (AEP) of 0.66%, Scottish legislative requirements (SPP7) requires a design standard of 0.5% AEP. As such the original FEH rainfall runoff method is also quoted within the report to provide a comparison.

Three methodologies, as above, have, therefore, been used to calculate the peak flows and hydrographs for the 0.5% and 1% annual exceedance probability (AEP) flood flows. The results of each method are addressed below.

4.2.1 Statistical Method

The statistical method is a direct approach to flood frequency calculation and is often used as a first choice if there is a long record of flow data available for the catchment. If the catchment is ungauged, as is the case with the Foveran Burn, and no flow data is available, then a pooling-group analysis is used to derive peak flows.

Pooling group analysis involves the identification of gauged catchments which are hydrologically similar to the subject catchment and deriving growth curve factors based on the pooling group characteristics, for the required annual exceedance probability. The number of catchments gathered in a pooling group is usually five times the return period e.g. for a 50 year return period (2% AEP) the required pooled data would be a minimum of 250 years. WINFAP-FEH, an industry standard computer program, is utilised for the pooling group analysis. The peak flow estimate is obtained as a product of an index flow, the Median Annual Maximum Flood (QMED), and a growth factor derived from pooled sites. The following are the steps involved in the prediction of estimated growth factors and flows.

- Step 1: Formation of pooling group for the various return period events for the current catchment.
- Step 2: Estimating the index flood, QMED for the site
- Step 3: Deriving the pooled growth curve
- Step 4: Pooled group frequency analysis - Estimated flows and fittings

A pooling-group was created for the Foveran Burn to determine the peak flow values. The FEH default selection pooling group was reviewed to ensure it was appropriate for use on the subject catchment and one station was removed (Station 54034, Dowles Brook @ Dowles) due to its high permeability, which was considered to be skewing the results.

QMED was estimated using catchment descriptors for the Foveran Burn catchment, exported from WINFAP-FEH. This gave a QMED value of 5.0m^3/s. FEH (Vol 3, Ch 4, s4.2) recommends that QMED estimates at ungauged sites should be adjusted by data transfer from a hydrologically similar gauged catchment, either donor or analogue, whenever possible. No gauged donor sites were identified either upstream or downstream of the study area, hence analogues were used. Six analogue sites were considered (**Appendix A - Table II**) and the average of adjustment factors taken. The peak flows for the Foveran Burn were estimated as a product of QMED and a growth factor derived from the pooling group. Table 4.1 shows peak flood flows estimated by this method (**Appendix D**).

Table 4.1 - Peak flows [m^3/s] obtained by FEH – Statistical Method

Annual Exceedance Probability [%]	Pooling Group Growth Factor	Peak Flow [m^3/s]
0.5	3.456	19.4
1	2.99	16.8

4.2.2 Rainfall – Runoff Method

This method converts a rainfall event into a runoff event using a rainfall-runoff model. The flow hydrograph produced by this method has a baseflow component and a storm runoff component. Estimation of the storm runoff component is via a Unit Hydrograph (UH) that describes the theoretical response of a catchment to a unit depth of effective rainfall in unit time.

As discussed previously the DMRB gives a requirement to utilise the most recent form of the rainfall runoff method, ReFEH. However, due to this methodology's limited calibration it is considered prudent to also undertake the original FEH methodology by way of comparison.

The following steps are involved in the estimation of the design hydrograph in both methods:

- Step 1: Synthesis of a unit hydrograph from the catchment characteristics.
- Step 2: Determination of a design storm profile.
- Step 3: Estimation of percentage runoff.
- Step 4: Production of flood hydrograph by the convolution of the design storm profile with the unit hydrograph and the addition of base flow.

Peak flood flows and hydrographs for the Foveran Burn have been estimated by both methods as follows:

4.2.2.1 FEH 'Revitalised' Rainfall-Runoff Method (ReFEH)

This method makes improvements to the key components of the original FSR/FEH rainfall-runoff method taking advantage of new data which has become available since its original publication. It also represents rainfall losses dynamically, rather than as a fixed value applied to the whole rainfall event. As discussed previously this method is not calibrated for annual exceedance probability events exceeding 0.66% (1:150 yrs).

Using this method peak flood flows of 14.9m^3/s and 13.3m^3/s are estimated for the 0.5% and 1% AEP event respectively (Table 4.2), these results are based on designed winter profile storm duration of 8.5hrs.

Table 4.2 - Peak flows [m^3/s] obtained by FEH 'Revitalised' Rainfall-Runoff Method

Annual Exceedance Probability [%]	Peak Flow [m^3/s]
0.5	14.9
1	13.3

4.2.2.2 FSR/FEH 'Restated' Rainfall-Runoff Method

Using the ungauged method as described in FEH (1999) peak flood flows of 19m^3/s and 15.58m^3/s are estimated for the 0.5% and 1% AEP event respectively (Table 4.3), these results are based on designed winter profile storm duration of 13.75hrs.

Table 4.3 - Peak flows [m^3/s] obtained by FSR/FEH 'Restated' Rainfall-Runoff Method

Annual Exceedance Probability [%]	Peak Flow [m^3/s]
0.5	19.0
1	15.6

4.3 Climate change

In order to accommodate the uncertainty of flood predictions with regard to a changing climate, the standard procedure is to increase flow predictions by 20%, as recommended by DMRB. This value reflects guidance from The United Kingdom Climate Change Impacts Programme (UKCIP). It is noted that *Price D.J. & McKenna J.E., Climate Change: Review of Levels of Protection offered by Flood Prevention Schemes UKCIP02 Update (2003), Scottish Executive. 2003.* suggests that in this locality (eastern Scotland) the future allowance for climate change may lie between 20% - 30%. Given the significant uncertainties associated with spatial analysis of the severity of climate change on this scale it is considered that there is not sufficient justification to use the higher figure and as such the 20% figure has been adopted.

4.4 Statement of adopted flows

For the purpose of the flow modelling exercise, the peak flow estimation based on the statistical method has been adopted. It is considered that this method gives the most accurate estimation of peak flows of the three methods used, it also represents the most conservative means of analysis. The design hydrographs for these events were obtained by scaling hydrographs taken from FSR / FEH 'Restated' Rainfall-Runoff Method to the peak flood flows. The peak flows adopted are shown in Table 4.4 and hydrographs are illustrated in **Appendix A - Figure I**.

Table 4.4 - Adopted peak flows [m^3/s]

Peak Flood Flows [m^3/s]		
Annual Exceedance Probability [%]	Excluding allowance for Climate Change	Including allowance for Climate Change
0.5	19.4	23.3
1	16.8	20.2

These figures were presented to SEPA for verification, Martin Boshoff (SEPA Hydrologist) has accepted that the values are suitable for use.

5.0 HYDRAULIC MODELLING

A mathematical hydraulic model of the Foveran Burn around the area under consideration was constructed using Infoworks RS modelling software. The model extended around 800m upstream and downstream of the current embankment position, this being the extents determined from site visits and knowledge of the operation of the software package. The software package used is industry standard and was developed by HR Wallingford. The Infoworks software has been used in the field of river and drainage modelling for a number of years.

An 'Unsteady State' analysis was undertaken, this type of analysis enables the runoff hydrographs for both historical and design events to be routed through the system to determine the movement of the flood event along the watercourse and importantly assess the effects of any storage attenuation. The primary benefits of the 'Unsteady State' model include:

- The analysis of the entire hydrograph;
- Storage attenuation effects along the reach;
- Flexibility in terms of the timing and coincidence of peak flows;
- Dynamic interaction between flow paths;
- Water volumes considered, not simply water levels.

The model was constructed from data extracted from the topographic survey of the area, carried out by CMCR Ltd over a number of days in late March 2007. The location of the model cross sections is shown in **Appendix C - Drawing P246600/GLA/103**. The model was used to establish the flood levels for the critical design event of 0.5% AEP including allowance for climate change. A general topographic survey of the area was used to determine inundation depth on the floodplains, between the surveyed cross-sections.

The 'unsteady state' analysis of flows for the Foveran Burn enables a better understanding of the response from the catchment, and allows an analysis of the effect on the floodplains generated by the proposed road embankment. Levels quoted in the following section are taken from the hydraulic model predictions, which are based on a 1 Dimensional (1D) model. It should be noted that these levels do not allow for any increase in levels which may occur locally as a result of 'super elevation' or turbulence within the watercourse. These factors are not considered as likely to be significant at this site and any increase in level would be well within the freeboard allowance, discussed in Section 6.

5.1 Channel characteristics

The Foveran Burn flows in a shallow channel typically 2.5m wide (**Appendix B – Photograph 2**), with a mainly rocky bed, riparian edges are well vegetated, floodplains are vegetated with short grasses (**Appendix B – Photograph 3**).

As discussed previously the watercourse runs through the base of a flat bottomed valley with steeply sloping sides. The main constriction to flow is formed by the current A90 embankment which crosses the valley downstream of Foveran village (**Appendix B – Photograph 4**). The watercourse at this point flows though a culvert which includes a low flow channel (**Appendix B – Photograph 5**).

The watercourse has an average gradient across the site of 1:124, dropping approximately 12.9m in 1.6km. Characteristics of the cross-sections used in the hydraulic model are shown in **Appendix A - Table III**.

5.2 Model calibration

The Foveran Burn is an ungauged watercourse and no river flow or historical flood information was available for the catchment. SEPA and Aberdeenshire Council were approached for any information which may assist in the calibration of the model, however, none was available. The constructed model is, therefore, essential un-calibrated. As a surrogate for calibration a sensitivity analysis has been undertaken to determine the sensitivity of the model to variations in key parameters.

5.3 Sensitivity – Existing case

A number of sensitivity runs were conducted to assess the models response to variations in the value of Manning's roughness along the base and sides of the watercourse.

The Manning's values used *(HEC-RAS Users Manual)* along the channel beds and floodplains were altered to take into consideration fluctuations in channel bed composition and vegetation density. Values of 0.03/0.035, 0.035/0.04 & 0.04/0.05 were considered for the channel bed/floodplains. Mannings values are used to represent the frictional losses through the existing culvert, given that it is highly unlikely that the existing culvert would be surcharged, the Manning's value was set to 0.025.

A maximum increase in water levels at cross section FB12 of 60mm and 120mm is observed when the mannings is increased to 0.035/0.04 and 0.04/0.05 respectively. The average increase across the model was 80mm and 160mm. **Appendix A - Table IV** shows water levels for each cross-section. This analysis would indicate that water levels in the channel are reasonably sensitive to changes in roughness.

For the purpose of the present study a conservative Manning's value of 0.05 is adopted to represent the banks of the river and floodplains; and 0.04 is used for the channel bed.

5.4 Results – Existing case

Estimated hydrographs for different annual exceedance probability events were run through the hydraulic model. The hydraulic model then generates peak water levels (**Appendix A - Table V**) which can then be used to generate an inundation envelope (**Appendix C – Drawing No. P246600/GLA/104**).

From the inundation envelopes for 0.5% AEP event and 0.5% AEP including allowances for climate change event (**Appendix C – Drawing No. P246600/GLA/104**) the flat area upstream of the existing A90 embankment is inundated. The inundation envelope is of a similar form for both events, with the event including climate change having a larger envelope. Downstream of the current embankment, the shape of the inundation envelope differs between the two events represented. It is observed that the extent of flooding has its maximum extension around cross section FB14 and FB17, when allowances for climate change are taken into account. For this event, the predicted peak water levels for cross sections FB12, FB14, FB19 and FB23 are 24.14mAOD, 23.65mAOD, 21.18mAOD and 18.58mAOD respectively.

The watercourse remains 'in bank' downstream of cross section FB18 for all the events analysed.

5.5 Sensitivity – Proposed case

The existing hydraulic model was modified in order to represent the proposed road which is placed in the vicinity of the cross-section FB13. This proposed road embankment was modelled

with a concrete culvert (4.2m x 3.0m), including a low flow channel. Cross-section FB13 was eliminated and two interpolation sections (culvert inlet, culvert outlet) were generated in order to represent the new road embankment.

Roughness values remain the same as those chosen in the existing situation. A further sensitivity analysis was carried out on Mannings values used to represent frictional losses through the proposed culvert. Hence, values of 0.013, 0.025 and 0.03 *(HEC-RAS Users Manual)* were assessed and results are presented in **Appendix A - Table VI**. As can be seen in this table, an increase in the frictional losses of the culvert generates an increase in water levels upstream. However, this increase in water level is experienced only up to section FB11 and does not generate a variation in water levels upstream of the existing embankment.

A maximum increase of 49mm was predicted when the frictional losses were increase from 0.013 to 0.03. For the purpose of representing the proposed situation, a Manning's of 0.025 was adopted for the new culvert.

5.6 Results - Proposed case

Estimated hydrographs for different annual exceedance probability events were run through the hydraulic model. Peak water levels are indicated in **Appendix A - Table VII**, and the inundation map is plotted in **Appendix C - P46600/GLA/105**.

As can be seen in **Appendix C - P246600/GLA/105**, the flooding area remains the same as in the existing case upstream of the existing A90 embankment and downstream of the proposed new embankment. A wider inundation area between the embankments is predicted.

For 0.5% AEP including allowances for climate change the predicted peak water levels for cross section FB12, FB14, FB19 and FB23 are 24.25mAOD, 23.65mAOD, 21.18mAOD and 18.58mAOD respectively. The maximum increase in water levels predicted between the embankments is 110mm, at cross section FB12.

A comparison of peak velocities was made between the existing and proposed case. It was determined that the proposals have a very minor impact on velocities immediately downstream of the culvert. Design of scour protection is not within the remit of this study, however, it should noted that scour protection will be required around the inlet and outlet of the culvert to protect against the erosion potential of the higher velocities and any turbulence created.

5.7 Extreme sensitivity

The DMRB indicates that for major projects a sensitivity check with the 0.1% AEP event is advisable. SPP7 also states that such a check should be carried out for essential civil infrastructure, a category of development types which includes major road projects. This to ensure that the proposed road can continue to function as an emergency route during periods of extreme rainfall.

To estimate the 0.1% AEP flow the hydrology methodologies used to date were considered not appropriate, due to the length of record required to give a suitable data set. As such the original FEH rainfall-runoff methodology was used to generate a peak flow. Based on the catchment characteristics extracted from FEH this methodology gave a peak flow of 27.1m^3/s for the 0.1% AEP event.

Within the hydraulic model of the proposals this flow gave a peak water level of 24.70m AOD at the location of the proposed road. This water level is lies within the barrel of the proposed culvert an as such the road surface is not at risk of inundation from such an event.

6.0 CONCLUSIONS

This study considered the potential of the proposed new road to impact on water levels within the watercourse and informs the design process to ensure that the watercourse does not inundate the proposed road. The flow generated by a 0.5% AEP event (including an allowance for climate change) was estimated using the FEH statistical method and then passed through a hydraulic model of the watercourse. The hydraulic model was altered to represent the proposals and re-run to determine any impacts of the proposals.

The modelling of the existing situation (**Appendix C – Drawing No. P246600/GLA/104**) indicated that much of the valley upstream of the existing embankment became inundated during a 0.5% AEP (including an allowance for climate change) and that the existing embankment represents a constraint to peak flows. Downstream of the existing embankment the peak flows spread back out over the base of the valley, although less extensively than in the upstream sections. Within 300m of the existing embankment all flow for the design event is contained within the channel.

Under the proposals for a new road alignment a new embankment will be placed across the valley on which the new road alignment will sit. A new culvert will convey the Foveran Burn through the embankment. The culvert size modelled was 4.2m x 3.0m, with inlet and outlet wingwalls set at an angle of 15° for the culvert barrel. The culvert was set on a gradient equal to the current channel bed slope.

The proposed new road alignment does not alter water levels downstream of the proposed embankment for the design event. Equally water levels upstream of the existing embankment are not affected. Between the existing and new embankments an increase in water depth and the extent of the flood envelope is observed. This is caused partially by the proposed embankment displacing a volume of flood storage and partly by the hydraulic losses (afflux) associated with the culvert inlet arrangement. A maximum peak water level rise of 0.11m was observed for a 0.5% AEP event (including and allowance for climate change).

An extreme scenario assessment was made to assess the impact of a 0.1% AEP event on the proposed road. A peak water level of 24.70m AOD was determined from this analysis. This level is still within the barrel of a 4.2m x 3.0m culvert and as such the size of the culvert continues to be the main factor in determining the minimum road level.

As such it is considered that the following points are required to mitigate the flood risk posed by, and to, the proposed road:

- The area shown on **Appendix C - P246600/GLA/106** be defined within the proposals as an area for provision of compensatory storage.
- Given that the model is uncalibrated a 600mm freeboard should be applied to the peak water level within the culvert. This would give a minimum culvert size of 4.2m x 3.0m, with a low flow channel out with these dimensions.

Regarding the flood attenuation area no ground works would be required within the assigned area as the embankment and dimensions of the culvert retain sufficient volume of water themselves to prevent any increase in downstream water levels. For the purpose of flood risk this principle has been agreed with SEPA.

APPENDIX A – FIGURES & TABLES

SYMBOL	DESCRIPTION	Value
AREA	Catchment drainage area (km^2)	31.76
FARL	Index of flood attenuation due to reservoirs & lakes	0.986
PROPWET	Index of proportion of time that soils are wet	0.42
ALTBAR	Mean catchment altitude (m above sea level)	79
ASPBAR	Index representing the dominant aspect of catchment slopes	64
ASPVAR	Index describing the invariability in aspect of catchment slopes	0.32
BFIHOST	Base flow index derived using the HOST classification	0.587
DPLBAR	Index describing catchment size and drainage path configuration (km)	6.76
DPSBAR	Index of catchment steepness (m/km)	35.5
LDP	Longest drainage path (km)	12.59
RMED-1H	Median annual maximum 1-hour rainfall (mm)	8
RMED-1D	Median annual maximum 1-day rainfall (mm)	31.2
RMED-2D	Median annual maximum 2-day rainfall (mm)	42.2
SAAR	1961-90 standard period average annual rainfall (mm)	797
$SAAR_{4170}$	1941-70 standard period average annual rainfall (mm)	866
SPRHOST	SPR derived using the HOST classification	28.15
URBCONC	Index of concentration of urban and suburban land cover	-
URBEXT1990	FEH index of fractional urban extent for 1990	0.0012
URBLOC	Index of location of urban and suburban land cover	-

Table I: Foveran Burn catchment parameters obtained form FEH-CD ROM

Analogue Catchments						
Rank	1	2	3	4	5	6
Site name	Bailey Brook	Bourne	Gowy	Partney Lynn	Riccal	Gifford Water
Station number	54052	40006	68015	30004	27058	20007
NGR	3629 3316	5632 1497	3497 3624	5402 3676	4661 4810	3511 6717
AREA	37.41	50.21	49.47	59.94	39.96	67.66
SAAR	707	719	731	685	859	770
BFIHOST	0.576	0.628	0.525	0.57	0.511	0.527
SPRHOST	30.8	29.5	31.7	32.4	34.5	32.8
FARL	0.983	0.969	0.993	0.98	1	0.98

Table II: FEH-statistical method – analogue catchments

Existing Situation Models				
Node	Chainage (m)	Bed Level (m AD)	Left Bank Level (m AD)	Right Bank Level (m AD)
FB04	291.81	28.72	29.60	30.27
FB05	373.67	27.19	28.26	28.05
FB06	462.07	26.29	27.09	27.15
FB07	563.67	25.31	26.82	26.75
FB08	632.65	24.60	24.96	25.64
FB09	698.35	24.08	25.36	25.70
FB10	771.62	23.43	29.90	29.90
FB11	787.60	23.31	29.90	29.90
FB12	839.90	22.64	23.79	25.07
FB13	877.95	22.08	23.30	23.14
FB14	920.76	21.90	23.29	23.28
FB15	980.89	21.38	22.80	23.28
FB16	1031.85	21.11	22.71	23.15
FB17	1079.02	21.12	22.29	22.53
FB18	1141.94	19.44	21.52	22.13
FB19	1191.41	19.39	21.11	21.35
FB20	1222.70	19.04	20.85	21.38
FB21	1262.71	18.75	20.56	20.75
FB22	1365.16	17.49	19.85	19.95
FB23	1464.85	17.00	19.01	19.13
FB24	1563.78	16.75	17.84	17.82
FB25	1571.07	16.26	17.04	17.31
FB26	1645.99	15.83	17.53	17.16

Table III: Cross-section information

0.5% AEP Maximum Water Levels [m, AOD]				
Cross-Section	Chainage [m]	Channel n0.03 Bank n0.035	Channel n0.035 Bank n0.04	Channel n0.04 Bank n0.05
FB04	291.81	29.84	29.93	30.01
FB05	373.67	28.59	28.65	28.71
FB06	462.07	27.69	27.76	27.83
FB07	563.67	26.43	26.51	26.59
FB08	632.65	25.74	25.80	25.90
FB09	698.35	25.33	25.40	25.46
FB10	771.62	24.61	24.75	24.83
FB11	787.60	24.40	24.45	24.49
FB12	839.90	23.95	24.01	24.07
F13	877.95	23.72	23.77	23.81
FB14	920.76	23.50	23.55	23.60
FB15	980.89	22.95	22.99	23.04
FB16	1031.85	22.43	22.46	22.50
FB17	1079.02	22.00	22.07	22.18
FB18	1141.94	21.45	21.55	21.64
FB19	1191.41	20.85	20.95	21.05
FB20	1222.70	20.39	20.50	20.59
FB21	1262.71	19.96	20.06	20.15
FB22	1365.16	19.10	19.25	19.40
FB23	1464.85	18.34	18.40	18.47
FB24	1563.78	17.76	17.87	17.94
FB25	1571.07	17.72	17.87	17.94
FB26	1645.99	17.22	17.33	17.48

Table IV: Manning roughness sensitivity analysis – 0.5% AEP

Existing Situation - Maximum Water Levels [m, AOD]			
Node	Chainage (m)	0.5% AEP + CC	0.5% AEP
FB04	291.81	30.13	30.01
FB05	373.67	28.80	28.71
FB06	462.07	27.93	27.83
FB07	563.67	26.70	26.59
FB08	632.65	25.99	25.90
FB09	698.35	25.55	25.46
FB10	771.62	24.96	24.83
FB11	787.60	24.60	24.49
FB12	839.90	24.14	24.07
F13	877.95	23.87	23.81
FB14	920.76	23.65	23.60
FB15	980.89	23.09	23.04
FB16	1031.85	22.54	22.50
FB17	1079.02	22.28	22.18
FB18	1141.94	21.77	21.64
FB19	1191.41	21.18	21.05
FB20	1222.70	20.74	20.59
FB21	1262.71	20.30	20.15
FB22	1365.16	19.55	19.40
FB23	1464.85	18.58	18.47
FB24	1563.78	17.94	17.94
FB25	1571.07	17.94	17.94
FB26	1645.99	17.54	17.48

Table V: Predicted water levels for different AEP events for the existing case.

0.5% AEP Maximum Water Levels [m, AOD]				
Node	Chainage [m]	n = 0.013	n = 0.025	n = 0.03
FB04	291.81	30.01	30.01	30.01
FB05	373.67	28.71	28.71	28.71
FB06	462.07	27.83	27.83	27.83
FB07	563.67	26.59	26.59	26.59
FB08	632.65	25.90	25.90	25.90
FB09	698.35	25.46	25.46	25.46
FB10	771.62	24.83	24.83	24.84
FB11	787.60	24.49	24.50	24.53
FB12	839.90	24.11	24.15	24.36
Culvert	876.01	23.64	23.90	24.13
FB14	920.76	23.60	23.60	23.60
FB15	980.89	23.04	23.04	23.04
FB16	1031.85	22.50	22.50	22.50
FB17	1079.02	22.18	22.18	22.18
FB18	1141.94	21.64	21.64	21.65
FB19	1191.41	21.04	21.04	21.05
FB20	1222.70	20.59	20.59	20.60
FB21	1262.71	20.15	20.15	20.15
FB22	1365.16	19.40	19.40	19.41
FB23	1464.85	18.45	18.45	18.47
FB24	1563.78	17.94	17.94	17.94
FB25	1571.07	17.94	17.94	17.94
FB26	1645.99	17.47	17.47	17.48

Table VI: Culvert sensitivity – proposed case

Proposed Situation: Maximum Water Levels [m, AOD]			
Node	Chainage (m)	0.5% AEP + CC	0.5% AEP
FB04	291.811	30.13	30.01
FB05	373.672	28.80	28.71
FB06	462.068	27.93	27.83
FB07	563.671	26.70	26.59
FB08	632.65	25.99	25.90
FB09	698.346	25.55	25.46
FB10	771.622	24.96	24.83
FB11	787.598	24.60	24.50
FB12	839.902	24.25	24.15
Proposed Culvert	876.013	23.98	23.90
FB14	920.764	23.65	23.60
FB15	980.889	23.09	23.04
FB16	1031.852	22.54	22.50
FB17	1079.016	22.28	22.18
FB18	1141.942	21.77	21.64
FB19	1191.407	21.18	21.04
FB20	1222.701	20.74	20.59
FB21	1262.708	20.30	20.15
FB22	1365.163	19.55	19.40
FB23	1464.851	18.58	18.45
FB24	1563.778	17.94	17.94
FB25	1571.07	17.94	17.94
FB26	1645.992	17.54	17.47

Table VII: Predicted water levels for different AEP events for the proposed case.

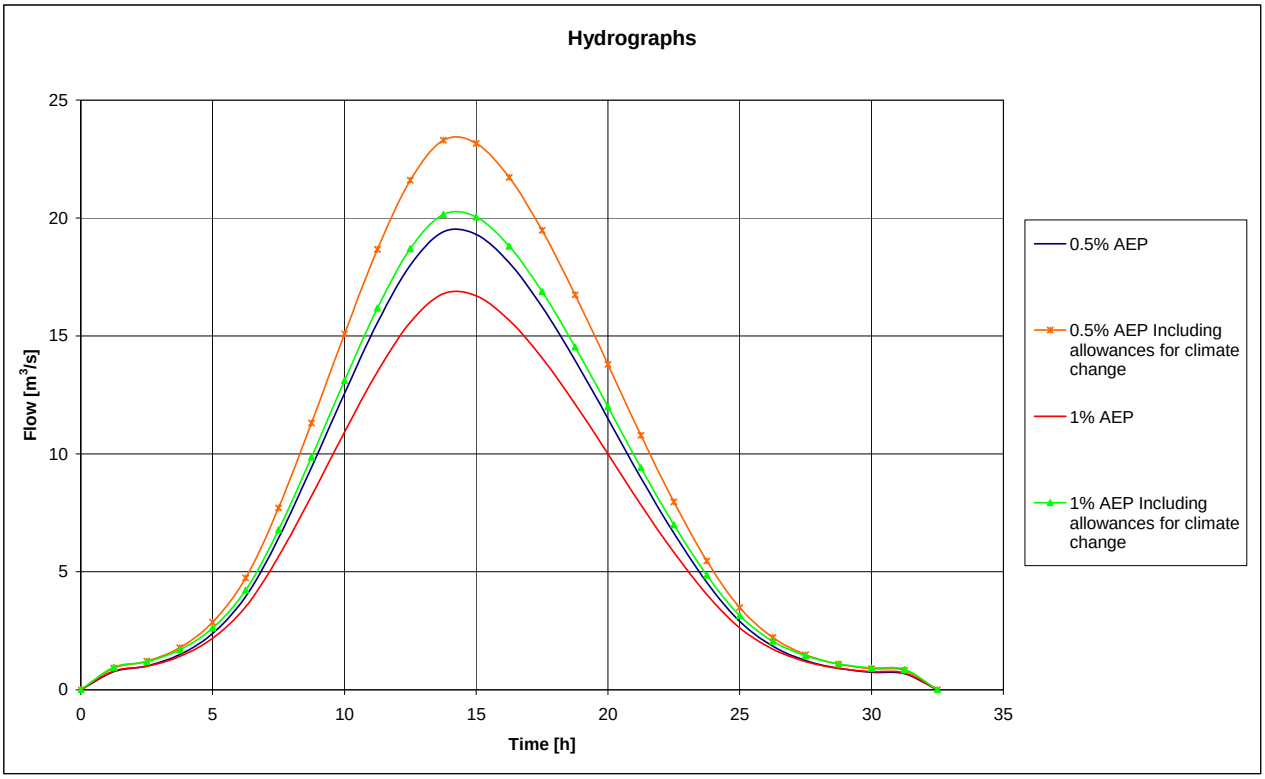


Figure I: Adopted hydrographs for different annual exceedance probability

APPENDIX B – PHOTOGRAPHS

Photograph 1 – Current A90 embankment (looking west)

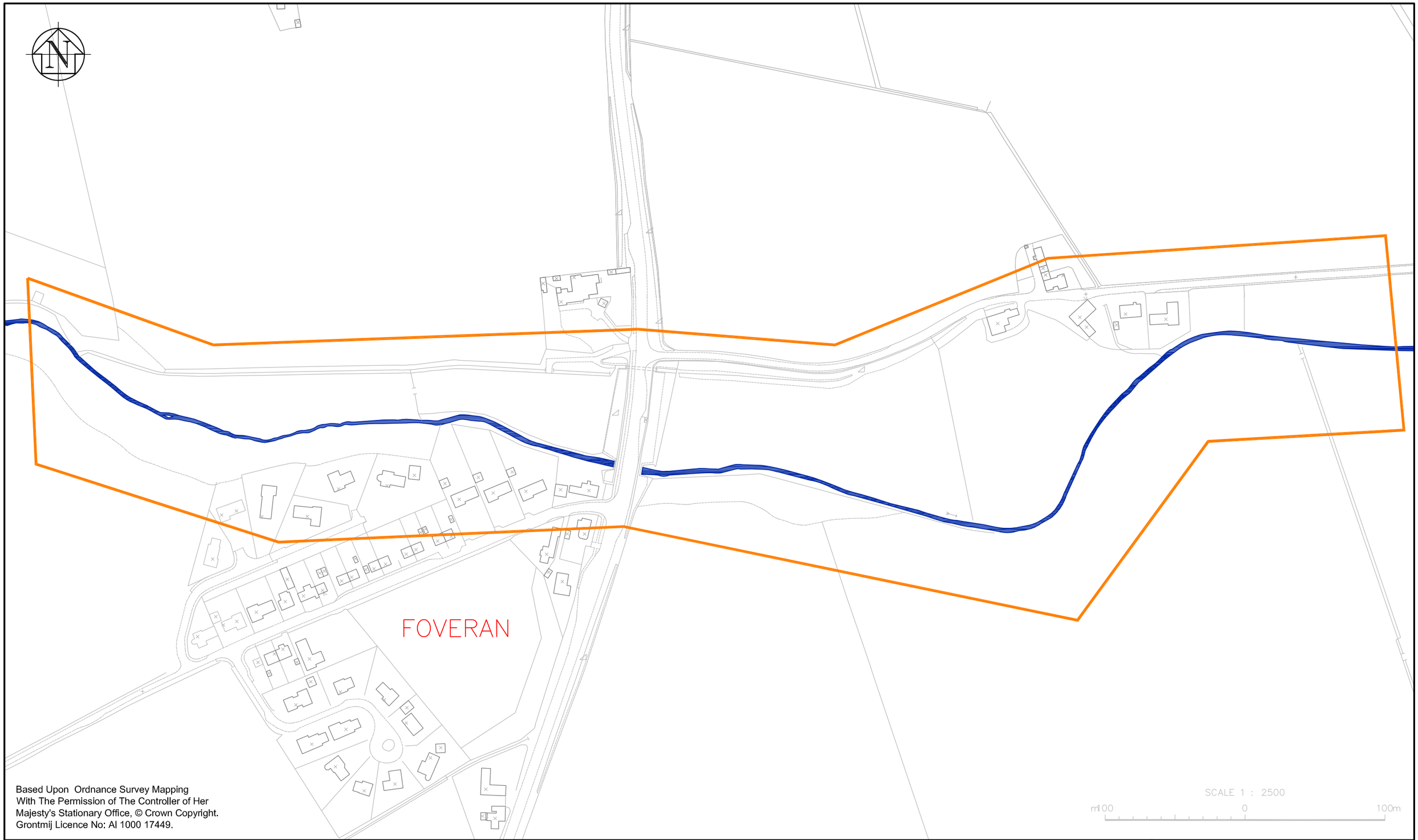
Photograph 2 – Typical channel view (looking east)

Photograph 3 – Floodplain d/s of current A90 embankment (looking east)

Photograph 4 – Embankment and culvert on current A90 embankment (looking west)

Photograph 5 – Current A90 culvert with low flow channel (looking west)

APPENDIX C – DRAWINGS



No.	Date	Revision	By	Chk
B	01/05/07	Final Issue	MVM	GCS
A	19/04/07	For comment	MVM	GCS

Drawn:	Checked:	Approved:	Date:
MVM	GCS	GEG	19/04/07

File Ref : C500	Drawing No : P246600/GLA/100	
Original Size: 420x297 - A3	Scale : 1:2500	Rev : B

Notes:-

- Study area
- Foveran Burn

Client

TRANSPORT SCOTLAND

An agency of SCOTTISH EXECUTIVE

Project / Title

A90 DUALLING
BALMEDIE - TIPPERTY

FOVERAN BURN FLOOD RISK ASSESSMENT

Site Location

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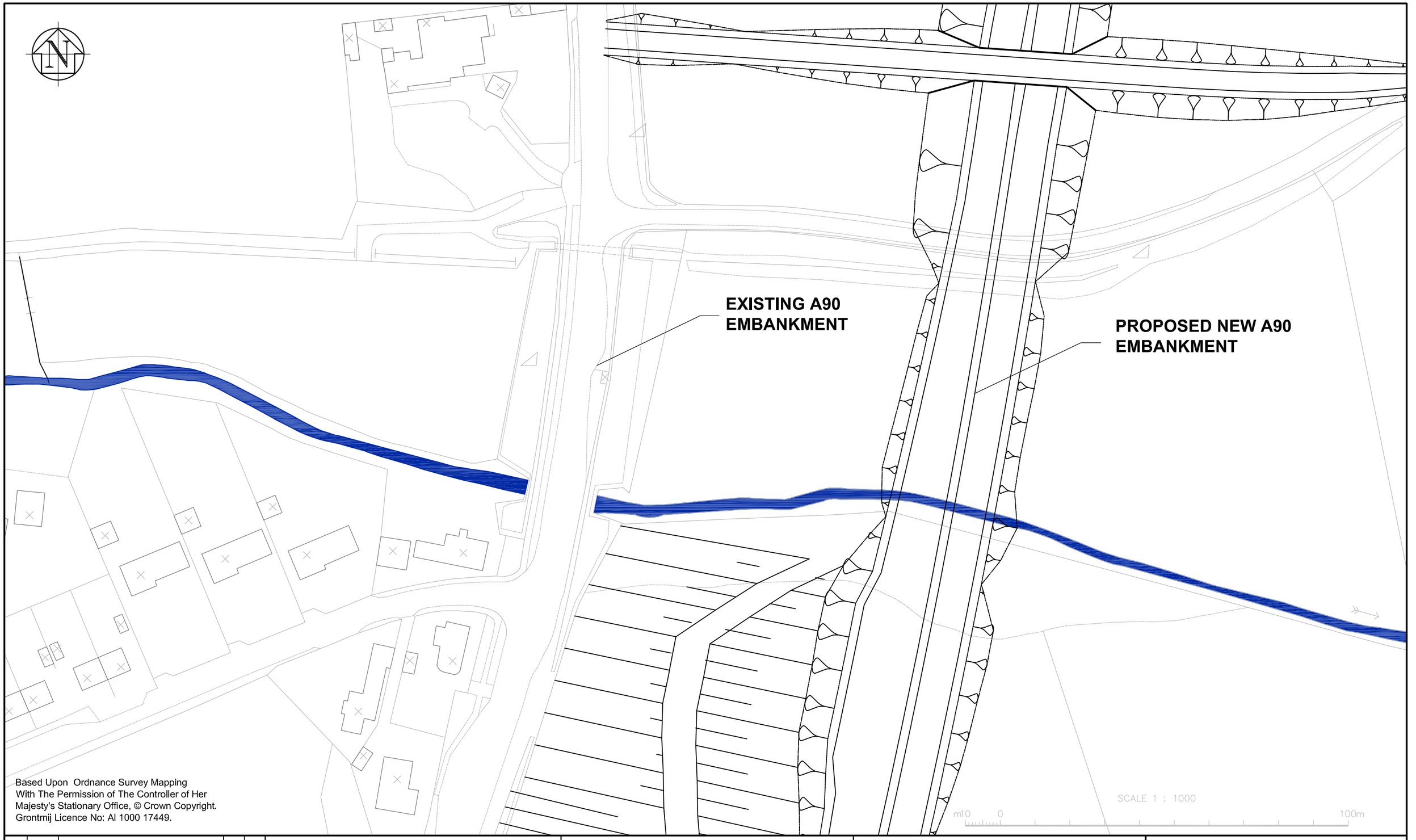

No.	Date	Revision	By	Chk
B	01/05/07	Final issue	MVM	GCS
A	19/04/07	For comment	MVM	GCS

Drawn:	Checked:	Approved:	Date:
MVM	GCS	GEG	19/04/07

File Ref : C500	Drawing No : P246600/GLA/101	
Original Size: 420x297 - A3	Scale : 1:1000	Rev : B

Notes:-

- Foveran Burn

Client

TRANSPORT SCOTLAND

An agency of SCOTTISH EXECUTIVE

Project / Title

A90 DUALLING
BALMEDIE - TIPPERTY

FOVERAN BURN FLOOD RISK ASSESSMENT

Outline proposals

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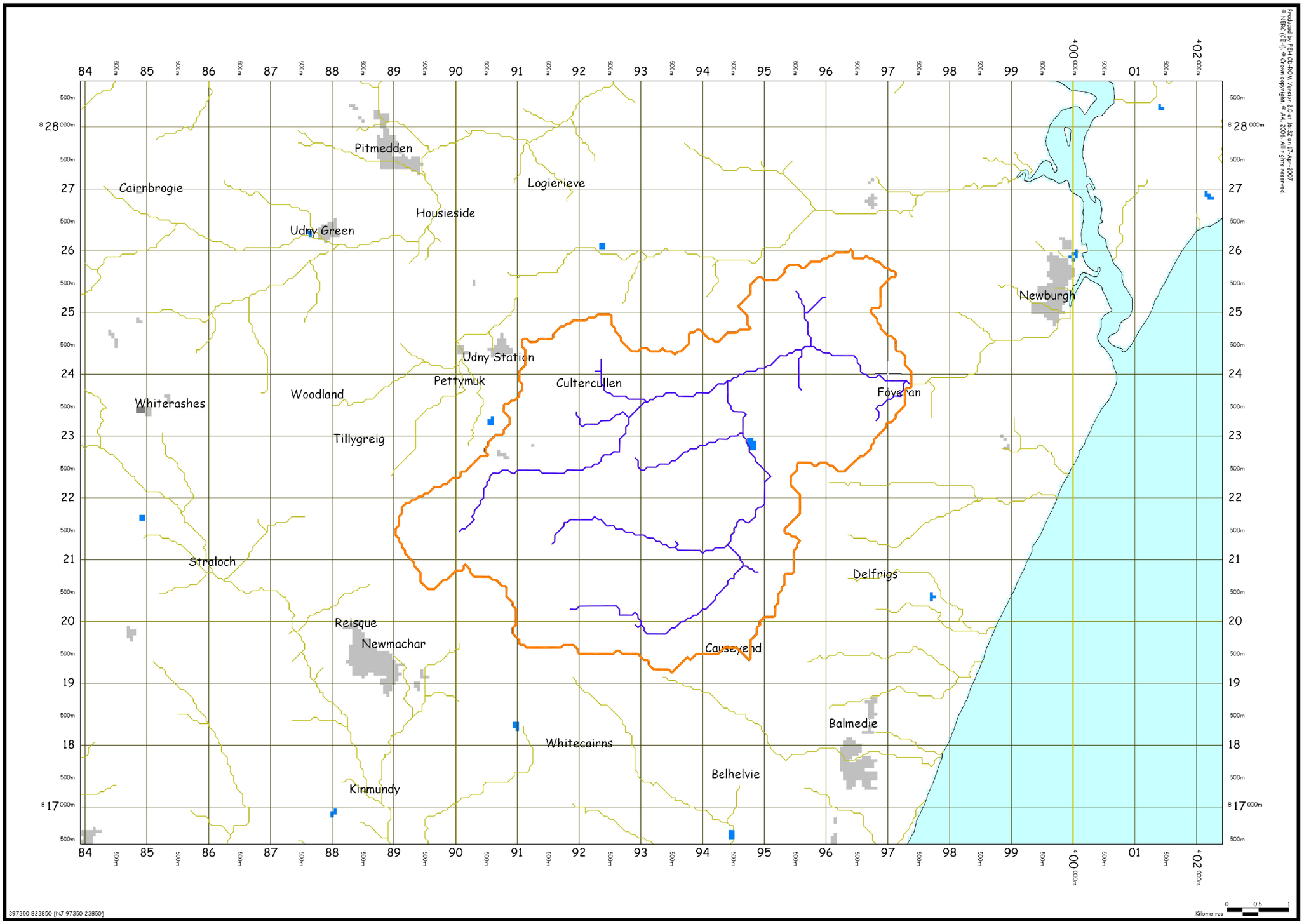

No.	Date	Revision	By	Chk
B	01/05/07	Final Issue	MVM	GCS
A	19/04/07	For comment	MVM	GCS

Drawn:	Checked:	Approved:	Date:
MVM	GCS	GEG	19/04/07

File Ref : C500	Drawing No : P246600/GLA/102	
Original Size: 420x297 - A3	Scale : As shown	Rev : B

Notes:-

- Catchment area

- Foveran Burn

Client

TRANSPORT SCOTLAND

An agency of SCOTTISH EXECUTIVE

Project / Title

A90 DUALLING
BALMEDIE - TIPPERTY

FOVERAN BURN FLOOD RISK ASSESSMENT

Foveran Burn Catchment Area

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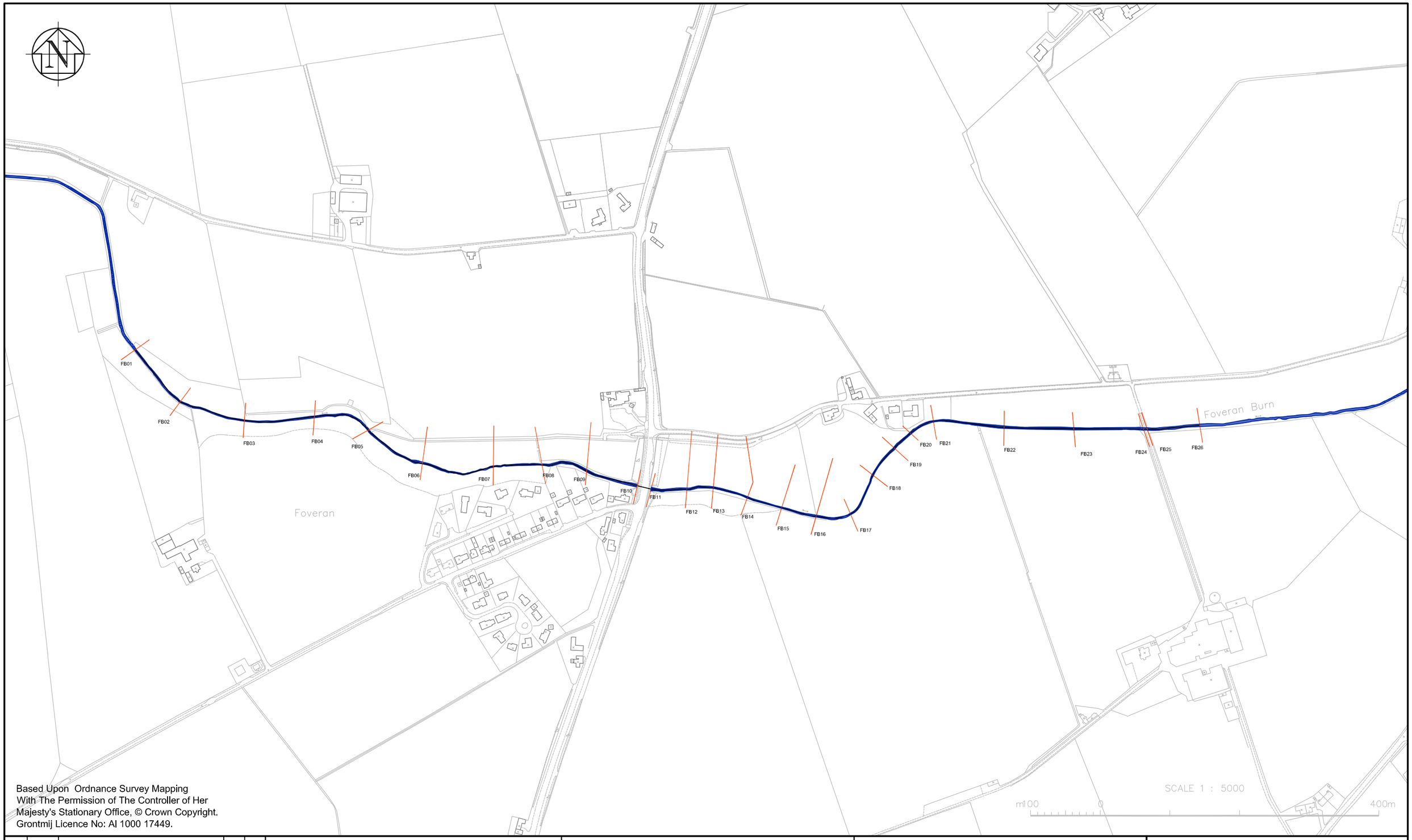

No.	Date	Revision	By	Chk
B	01/05/07	Final Issue	MVM	GCS
A	19/04/07	For comment	MVM	GCS

Drawn:	Checked:	Approved:	Date:
MVM	GCS	GEG	19/04/07

File Ref : C500	Drawing No : P246600/GLA/103	
Original Size: 420x297 - A3	Scale : 1:5000	Rev : B

Notes:-

Client

TRANSPORT SCOTLAND

An agency of SCOTTISH EXECUTIVE

Project / Title

A90 DUALLING
BALMEDIE - TIPPERTY

FOVERAN BURN FLOOD RISK ASSESSMENT

Hydraulic Model Cross-section

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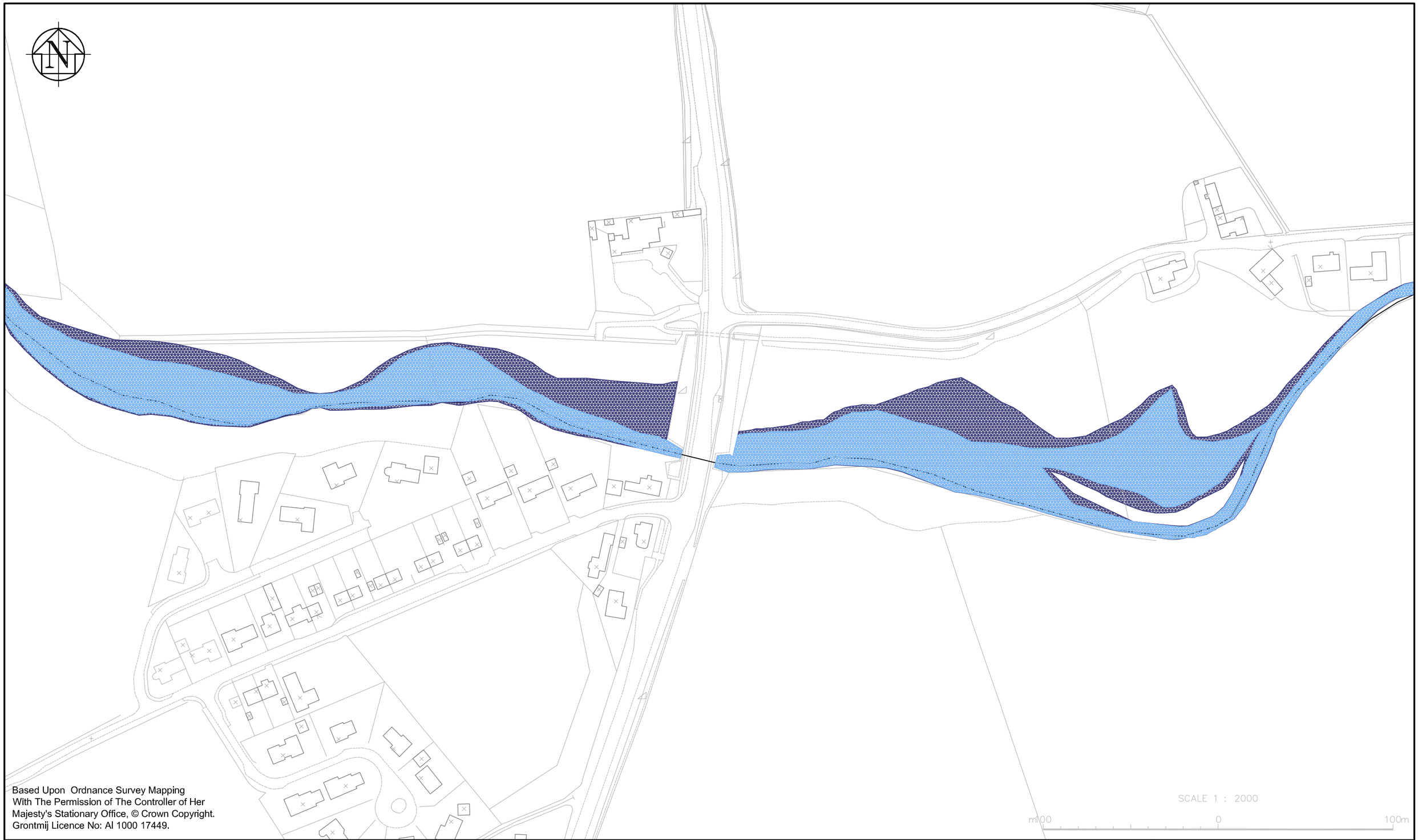

Based Upon Ordnance Survey Mapping
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No.	Date	Revision	By	Chk
B	01/05/07	Final Issue	MVM	GCS
A	19/04/07	For comment	MVM	GCS

Drawn:	Checked:	Approved:	Date:
MVM	GCS	GEG	19/04/07

File Ref : C500	Drawing No : P246600/GLA/104	
Original Size: 420x297 - A3	Scale : 1:2000	Rev : B

Notes:-

- 0.5% AEP inundation area

- 0.5% AEP inundation area (including allowance for climate change)

Client

TRANSPORT SCOTLAND

An agency of SCOTTISH EXECUTIVE

Project / Title

A90 DUALLING
BALMEDIE - TIPPERTY

FOVERAN BURN FLOOD RISK ASSESSMENT

Inundation plan - Exisiting

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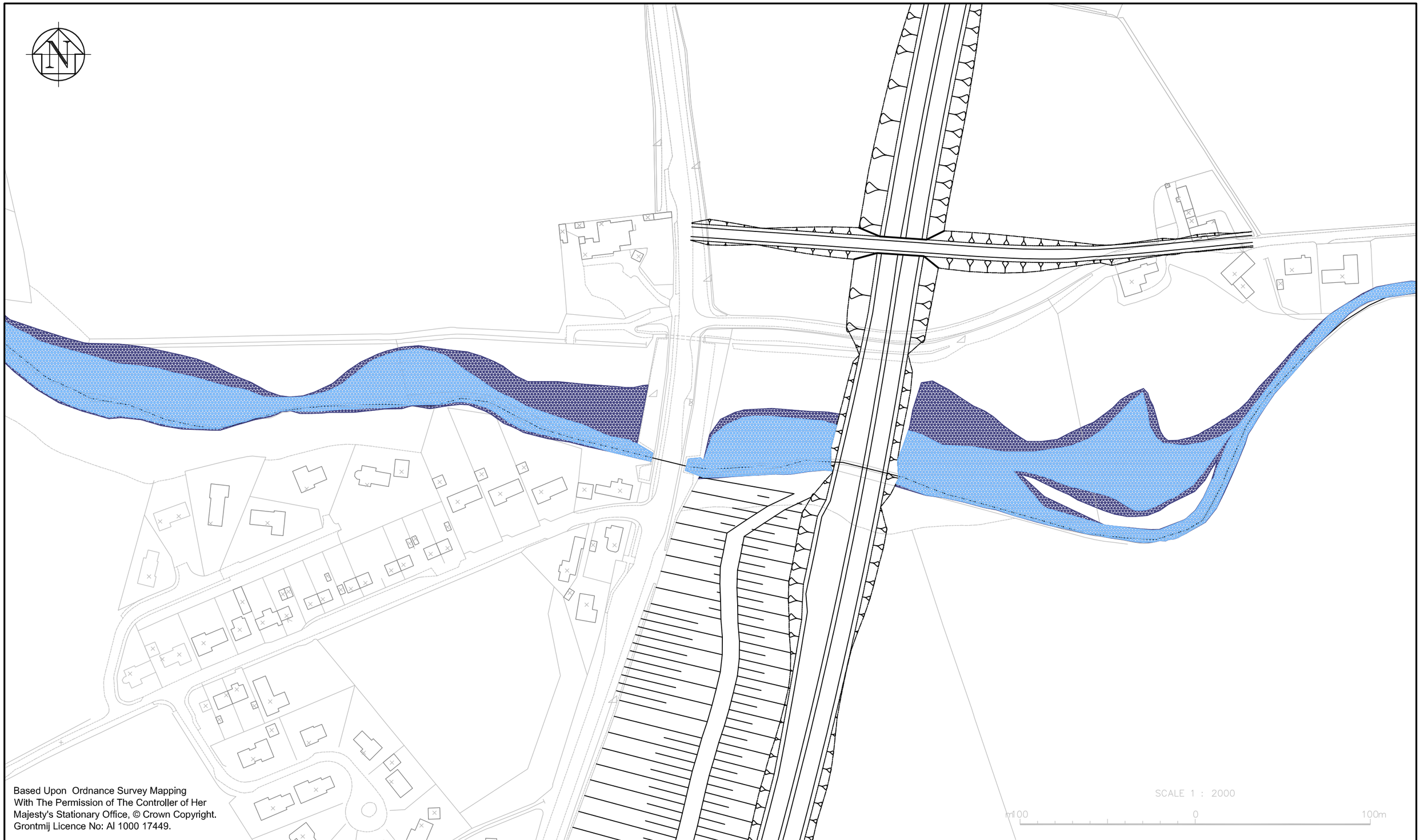

No.	Date	Revision	By	Chk
B	01/05/07	Final Issue	MVM	GCS
A	19/04/07	For comment	MVM	GCS

Drawn:	Checked:	Approved:	Date:
MVM	GCS	GEG	19/04/07

File Ref : C500	Drawing No : P246600/GLA/105	
Original Size: 420x297 - A3	Scale : 1:2000	Rev : B

Notes:-

- 0.5% AEP inundation area

- 0.5% AEP inundation area (including allowance for climate change)

Client

TRANSPORT SCOTLAND

An agency of SCOTTISH EXECUTIVE

Project / Title

A90 DUALLING
BALMEDIE - TIPPERTY -

FOVERAN BURN FLOOD RISK ASSESSMENT

Inundation plan - Proposed

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Leeds. London. Peterborough. Reading. Solihull. Wrexham.

APPENDIX D – FEH POOLING GROUP SUMMARY

FEH Flood Estimation

Catchment Descriptors

Site	Balmedie
Watercourse	Foveran Burn
NGR	397350 823850
AREA	31.76
ALTBAR	79
ASPBAR	64
ASPVAR	0.32
BFIHOST	0.587
DPLBAR	6.76
DPSBAR	35.5
FARL	0.986
LDP	12.59
PROPWET	0.42
RMED-1H	8
RMED-1D	31.2
RMED-2D	42.2
SAAR	797
SAAR4170	866
SPRHOST	28.15
URBCONC1990	-999999
URBEXT1990	0.0012
URBLOC1990	-999999
C	-0.01043
D1	0.42995
D2	0.42197
D3	0.23626
E	0.22392
F	2.22839
C(1 km)	-0.01
D1(1 km)	0.422
D2(1 km)	0.414
D3(1 km)	0.235
E(1 km)	0.224
F(1 km)	2.206

FEH Flood Estimation

CALCULATION OF CATCHMENT DESCRIPTORS QMED

Name of site Balmedie
Name of watercourse Foveran Burn

NGR

	CD-ROM	ADJUSTED	ADJUSTMENT METHOD	REASONS
AREA	31.76	NO		
SAAR	797	NO		
BFIHOST	0.587	NO		
SPRHOST	28.15	NO		
FARL	0.986	NO		
URBEXT1990	0.0012	NO		
PROPWET	0.42	NO		
DPLBAR	6.76	NO		
DPSBAR	35.5	NO		
ALTBAR	79	NO		
ASPBAR	64	NO		
ASPVAR	0.32	NO		
LDP	12.59	NO		
RMED-1H	8	NO		
RMED-1D	31.2	NO		
RMED-2D	42.2	NO		
SAAR4170	866	NO		

Urban Adjustment

	CD ROM	ADJUSTED
PRUAF	1.00	NO
UAF	1.00	NO
QMED (RURAL)	5.00	NO
QMED (URBAN)	5.01	NO

FEH Flood Estimation

Data Transfer

				Analogues					
	Subject site	**Limits**		1	2	3	4	5	6
Site name	Balmedie			Bailey Brook	Bourne	Gowy	Partney Lynn	Riccal	Gifford Water
Station number				54052	40006	68015	30004	27058	20007
NGR				3629 3316	5632 1497	3497 3624	5402 3676	4661 4810	3511 6717
Donor/Analogue									
AREA	31.76	6.35	158.8	37.41	50.21	49.47	59.94	39.96	67.66
SAAR	797	638	996	707	719	731	685	859	770
BFIHOST	0.587	0.407	0.767	0.576	0.628	0.525	0.57	0.511	0.527
SPRHOST	28.15	13.15	43.15	30.8	29.5	31.7	32.4	34.5	32.8
FARL	0.986	0.936	1.036	0.983	0.969	0.993	0.98	1	0.98
URBEXT									
PROPWET	0.42								
DPLBAR	6.76								
DPSBAR	35.5								
ALTBAR	79								
ASPBAR	64								
ASPVAR	0.32								
LPD	12.59								
RMED-1H	8								
RMED-ID	31.2								
RMED-2D	42.2								
SAAR4170	866								
Qmed (AM)				2.524	6.767	7.869	7.128	11.255	15.275
Qmed (CD)	5.01								
Qmed (AM)/Qmed (CD)				0.5200	1.3200	0.9700	1.0300	1.4800	1.4100
QMED following data transfer				2.615	6.6266	4.882	5.1636	7.4	7.0529

Average 5.62

FEH Flood Estimation

Derived Pooling Group

Pooling group derived using WINFAP (Windows Frequency Analysis Package) with adjustments based on FEH and DEFRA recommendations

Gauging Station	Years	L-CV	L-Skewness	L-Kurtosis	Discordancy	Distance
10003 (Ythan @ Ellon)	12	0.256	-0.131	-0.032	2.352	1.506
10001 (Ythan @ Ardlethen)	45	0.175	0.088	0.258	0.816	1.423
11002 (Don @ Haughton)	23	0.181	0.162	0.229	0.847	1.74
11001 (Don @ Parkhill)	23	0.231	0.232	0.272	0.536	1.965
10002 (Ugie @ Inverugie)	23	0.284	0.133	0.03	0.576	1.303
12002 (Dee @ Park)	22	0.169	-0.042	0.088	0.771	2.346
54052 (Bailey Brook @ Ternhill)	22	0.167	-0.044	0.166	1.032	0.335
40006 (Bourne @ Hadlow)	29	0.395	0.465	0.385	1.603	0.454
68015 (Gowy @ Huxley)	19	0.293	0.192	0.217	0.073	0.526
30004 (Partney Lymn @ Partney Mill)	31	0.274	0.066	0.046	0.442	0.533
20006 (Biel Water @ Belton House)	20	0.381	0.076	0.002	2.319	0.552
27058 (Riccal @ Crook House Farm)	17	0.254	-0.045	-0.051	1.353	0.557
52016 (Currypool Stream @ Currypool Farm)	23	0.32	0.328	0.066	1.962	0.559
20007 (Gifford Water @ Lennoxlove)	19	0.412	0.294	0.212	1.208	0.572
25019 (Leven @ Easby)	23	0.377	0.419	0.323	1.059	0.581
41028 (Chess Stream @ Chess Bridge)	27	0.19	0.199	0.161	1.276	0.624
52007 (Parrett @ Chiselborough)	13	0.192	0.186	0.389	1.623	0.625
41027 (Rother @ Princes Marsh)	22	0.296	0.166	0.147	0.069	0.629
53017 (Boyd @ Bitton)	21	0.261	0.175	0.177	0.028	0.632
52003 (Halse Water @ Bishops Hull)	31	0.324	0.378	0.283	0.801	0.64
52017 (Congresbury Yeo @ Iwood)	19	0.232	0.063	0.076	0.264	0.659
53013 (Marden @ Stanley)	25	0.278	0.127	0.087	0.191	0.677
20005 (Birns Water @ Saltoun Hall)	30	0.29	0.211	0.258	0.17	0.681
19004 (North Esk @ Dalmore Weir)	31	0.237	0.271	0.284	0.74	0.69
52011 (Cary @ Somerton)	29	0.138	-0.072	0.145	1.282	0.691
19008 (South Esk @ Prestonholm)	26	0.378	0.297	0.269	0.786	0.699
29009 (Ancholme @ Toft Newton)	20	0.313	0.238	0.337	0.791	0.732
67009 (Alyn @ Rhydymwyn)	38	0.216	0.174	0.191	0.388	0.742
30012 (Stainfield Beck @ Stainfield)	10	0.315	0.281	0.435	1.747	0.75
21016 (Eye Water @ Eyemouth Mill)	26	0.249	0.025	0.177	0.723	0.752
49004 (Gannel @ Gwills)	23	0.26	0.085	0.025	0.513	0.755
30017 (Witham @ Colsterworth)	16	0.226	0.183	0.129	0.592	0.778
29004 (Ancholme @ Bishopbridge)	26	0.317	0.306	0.362	0.783	0.78
25007 (Clow Beck @ Croft)	15	0.368	0.215	0.151	0.683	0.787
33045 (Wittle @ Quidenham)	25	0.372	0.196	0.102	0.893	0.796
41022 (Lod @ Halfway Bridge)	21	0.263	0.238	0.201	0.258	0.796
31010 (Chater @ Fosters Bridge)	26	0.289	0.048	0.034	0.686	0.806
13001 (Bervie @ Inverbervie)	16	0.199	0.208	-0.05	4.373	0.807
29005 (Rase @ Bishopbridge)	13	0.367	0.29	0.344	1.211	0.812
41016 (Cuckmere @ Cowbeech)	15	0.442	0.445	0.166	2.179	0.815
66004 (Wheeler @ Bodfari)	18	0.194	0.051	0.11	0.381	0.838
44003 (Asker @ Bridport)	13	0.228	0.2	0.358	0.976	0.853
19011 (North Esk @ Dalkeith Palace)	29	0.261	0.154	0.115	0.141	0.864
55018 (Frome @ Yarkhill)	25	0.1	-0.189	0.109	2.501	0.869
Total number of sites	44					
Total	1000					
Weighted means		0.265	0.165	0.181		

Application of Growth Factors to adjusted QMED

Pooling group adjustment

Station number	Add, move, check delete	Reason
10003	Added, moved to high ranking	
10001	Added, moved to high ranking	
11002	Added, moved to high ranking	
11001	Added, moved to high ranking	
10002	Added, moved to high ranking	
13001	Checked	Discordant, but included in Hifows database therefore

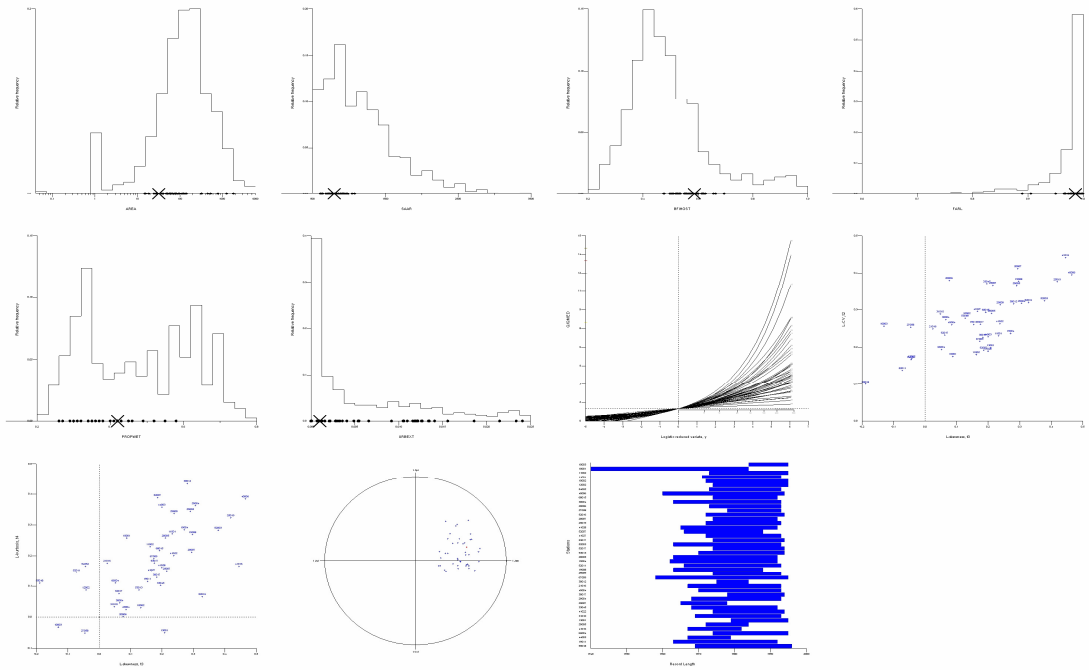
NB - Low ranking sites were removed after inclusion of local sites to maintain 5T years of data

Distribution used - Generalised Logistic

QMED = 5.62
UAF = 1.00

T	Growth curve fittings			FFC
	x_{Trural}	Urban adjustment	x_{Turban}	Q_T
2	1	1.00	1.00	5.62
5	1.433	1.00	1.43	8.06
10	1.736	1.00	1.74	9.76
25	2.161	1.00	2.16	12.14
50	2.516	1.00	2.51	14.13
100	2.91	1.00	2.91	16.34
200	3.348	1.00	3.34	**18.80**

Diagnostic Plots



10 ECOLOGY AND NATURE CONSERVATION

10.1 INTRODUCTION

This chapter sets out the findings of the ecological assessment of the proposals. Effects on water quality are appraised in Chapter 9. The findings of the appraisal are taken into account in the assessment of ecological effects in this chapter.

10.2 SOURCES OF INFORMATION

The following sources of information have been used:

- site visits in 2005 and 2006;
- Phase 1 surveys[121] undertaken by Natural Capital between September 2005-February 2007;
- information in the 1995-1996 Stage 2 and Stage 3 reports[122];
- consultations with SNH, SEPA, and other relevant organisations including the North East Scotland Biological Records Centre (NESBReC) to identify known ecological interests of the area (and in particular in relation to the SAC) and the required scope of the assessment;
- a desk study of relevant information including the sources listed in the footnotes in this chapter;
- protected species survey (badger, otter and water vole) by Grampian Badgers from June to October 2006 (see Confidential Appendix);
- a breeding bird survey undertaken by Jon Hardey in June and July 2006 (see Appendix 10.2);
- a bat survey undertaken by Toni Watt in September and November 2006 (findings summarised in Section 10.5); and
- best practice guidance including that of the Institute of Ecology and Environmental Management (IEEM)[123].

10.3 CONSULTATIONS

Information provided by consultees (SNH, Aberdeenshire Council, NESBReC, local wildlife groups etc), contained in relevant reports and collated through field visits and surveys was reviewed and is reported in the baseline section below.

Key issues raised by consultees are summarised in Annex A and included:

- the potential impact of construction and operational run-off from the road entering watercourses and indirectly impacting upon protected sites or species;
- the potential impact of the proposals on protected species; and
- potential impacts to a raised bog located east of the scheme (NJ980258).

In addition discussions with SNH helped to establish the scope of the required surveys to inform the appraisal.

[121] A standardised system developed by the former Nature Conservation Council to allow identification of areas of habitat of nature conservation interest relatively rapidly over a wide area
[122] op cit
[123] IEEM, Guidelines for Ecological Assessment in the United Kingdom. IEEM, version 7 July 2006

10.4 FIELD SURVEY

A Phase 1 type Habitat Survey of the site and its immediate surrounds[124] extended for use in EIA[125] was undertaken between September 2005 and September 2006 (see Section 10.6). A further site visit was made in February 2007 to look at the two proposed link roads south of Balmedie. The findings of the Phase 1 surveys were used to identify areas or species of nature conservation interest.

An extended Phase 1 survey is a recognised method of identifying habitats, which may be of importance and also to identify areas, which could support important fauna, including protected species. If the Phase 1 survey identifies potentially important habitats and species further survey may be required. Early survey and consultations identified the need for further animal surveys. No requirement for further botanical survey was identified. Records of any fauna sighted during the surveys were recorded.

A breeding bird survey was undertaken by Jon Hardey in June and July 2006 (see also Section 10.5.4). Twelve survey plots were chosen as representative of the whole study area[126] and to ensure that areas of potential ornithological interest such as woodland and ponds were also included. These were located from relevant ordnance survey maps. The size of the plots was determined by the size of the landscape feature (wood, pond) and the corridor of interest. The farmland plots were 25ha in area and were square to minimise edge effects. Each survey plot was visited on three occasions. The visits were started between 04.30 and 09.00 in the morning or between 18.00 and 21.00 in the evening to cover the most active times for breeding birds[127]. A full description of the survey methodology is contained in Appendix 10.2

A protected species survey was undertaken by Grampian Badger Surveys (see Section 10.5.4). Fieldwork for the protected species surveys was undertaken between June and November 2006 to cover times of optimal species activity and also variations in vegetation. A search corridor of 500m around the proposed route was identified. Signs of otter, water vole and badger were looked for including refuges, runs, faeces and feeding remains. A full description of survey methodology is contained in the confidential protected species report.

A bat survey was undertaken in August 2006 to identify areas with potential for bats (see Section 10.5.4). The survey was carried out by car and on foot. The survey concentrated on identifying suitable bat habitats, linear routes and foraging areas and other bat issues where there could be areas of potential conflict between the proposals and bat interests.

10.4.1.1 Survey Limitations

The scope of ecological surveys was discussed and agreed with SNH. It is considered that the surveys which were undertaken have provided a good record and understanding of the ecological interests of the area of the proposals and their environs. Habitat survey has mainly taken place in the summer months and some spring flowering species may have been overlooked. The level of survey

[124] JNCC, Handbook for Phase 1 habitat survey. A technique for environmental audit. JNCC, 2003
[125] Institute of Environmental Assessment, Guidelines for Baseline Ecological Assessment. Spon, London, 1995
[126] These were chosen to help identify bird interests of all sub-options which were considered (see Section 2.4)
[127] Gilbert, G., Gibbons, D.W. & Evans, J. Bird Monitoring Methods: A Manual of Techniques for Key UK Species. RSPB/ BTO/ JNCC/ WWT/ ITE/ The Seabird Group. RSPB/ BTO, Sandy, 1998

is, however, considered adequate for the type of habitats which are present along the route.

The bat survey was carried out later in the season than would be considered ideal (it was undertaken in September and November 2006) but the lack of suitable habitat for feeding or roosting indicated that this was unlikely to be significant to the findings. No houses were checked for bats. None would be demolished and the route has been sited as far as possible from properties which again would reduce the potential for any impacts on bats if present. Seasonal vegetation (dense ground cover) may have obscured some badger records but the badger surveyor did not consider this would materially affect the survey findings which confirmed that no setts were identified within 30m of the proposed scheme.

The breeding bird survey was undertaken quite late in the season (June-July 2006). It had originally been agreed with SNH that a survey was not required but at a later stage it was advised that a check should be made. It is considered that the data provide a fair representation of the bird interests of the area given the fairly limited habitats present in the scheme corridor.

10.5 BASELINE ECOLOGY

10.5.1 Introduction

This section introduces the ecological interests of the site and surrounding environment. Related information is also included in the following Section 9.5, Freshwater Quality and Drainage. The ecological baseline was collated from the desk review, consultations and the field surveys (see Sections 10.3, 10.4 and Annex A). Figures 10.2a-c illustrate the Phase 1 mapping of the study area. Target notes (TNs) are included in Appendix 10.1. The findings of the breeding bird survey are included in Appendix 10.2. The findings of the protected species surveys are contained in a confidential report.

10.5.2 General Ecological Context

The route corridor is rural in character with farmland (arable and pasture), scattered settlements and a number of small watercourses and ditches draining west to east towards the sea. Woodland and hedges in the area are sparse with the exception of shelterbelts associated with farms and other properties, small groups of mainly deciduous trees and shrubs, and areas of young mixed plantation forestry. There are more extensive woodlands at the Menie Estate which is east of the route. Gardens in Balmedie, Foveran and Tipperty and at other properties add some biodiversity interest in proximity to the route. There are extensive sand dunes at the coast and an important estuary (the Ythan) east of Newburgh (see Section 10.5.3).

10.5.3 Designated Sites

SNH has advised that the following designated sites are within 3km of the study corridor (see Figure 10.1a-b):

- *Sands of Forvie and the Ythan Estuary Site of Special Scientific Interest (SSSI)*[128]: a large sand dune system, probably the least disturbed in Britain, which supports several internationally important habitats and populations of breeding birds. The system is closely associated with the adjacent Foveran Links SSSI.

- *Foveran Links SSSI*: the site comprises a dynamic assemblage of sandy beach, dune formations, a large wind eroded sand plain and a shifting sand spit. It is of special interest due to the very high quality example of the dune features that characterise the sand dune coastline of north east Scotland. It is also exceptionally important for the study of a wide variety of coastal landforms and processes and supports a range of important plant communities reflecting the acid nature of the sand and varying stability of the different dune types and associated land forms.

- *Ythan Estuary, Sands of Forvie and Meikle Loch Ramsar Site*[129]*, Special Area of Conservation (SAC)*[130] *and Special Protection Area (SPA)*[131]: This site covers an area of 734.05ha and is designated for supporting the following Annex I habitats:

    - embryonic shifting dunes;
    - shifting dunes along the shoreline with *Ammophila arenaria* (marram) (white dunes);
    - decalcified fixed dunes with *Empetrum nigrum* (crowberry) (this is the priority feature); and
    - humid dune slacks.

- *Forvie National Nature Reserve*[132]*:* A large area of sand dunes and coastal heath lying next to the Ythan Estuary and included within the SAC.

The Foveran Burn and the Tarty Burn discharge into the Ythan Estuary. SNH in their consultation response drew attention to the importance of preventing construction run-off entering the burn and impacting on protected species or the designated sites.

10.5.4 Habitats and Species of Note

This section describes the habitats and species of interest in the area, that is, those that are specially protected by law or which have been identified as being of conservation concern or identified as being worthy of targets for protection and

[128] A SSSI is an area that has been notified as being of special interest due to its flora, fauna or geological or physiographical features under the Wildlife and Countryside Act 1981 and the Nature Conservation (Scotland) Act, 2004

[129] Wetlands of International Importance designated under criteria agreed at the Ramsar Convention, Iran 1971

[130] Special Areas of Conservation (SACs) are strictly protected sites designated under the Habitats and Species Directive (92/43/EEC). Article 3 of the Habitats Directive requires the establishment of a European network of important high-quality conservation sites that will make a significant contribution to conserving the 189 habitat types and 788 species identified in Annexes I and II of the Directive (as amended). The listed habitat types and species are those considered to be most in need of conservation at a European level (excluding birds). Of the Annex I habitat types, 78 are believed to occur in the UK. Of the Annex II species, 43 are native to, and normally resident in, the UK (www.jncc.gov.uk)

[131] Special Protection Areas (SPAs) are strictly protected sites classified in accordance with Article 4 of the EC Directive on the conservation of wild birds 79/409/EEC, the Birds Directive. They are classified for rare and vulnerable birds, listed in Annex I to the Birds Directive, and for regularly occurring migratory species

[132] National Nature Reserves are designated under the National Parks and Access to the Countryside Act, 1949 to protect the most important areas of wildlife habitat and geological formations in Britain and as places for scientific research

enhancement. The detailed findings of the protected species surveys are contained in a confidential report.

Otter
The protected species survey indicated otter activity in the vicinity of the site and historically there have been otter mortalities along the existing A90 at Blairton, Orrock, Delfrigs and Foveran (*pers comm.*, surveyor). Spraints and footprints were found along the Foveran Burn and footprints along the Sandend and Eigie Burns. Otter (*Lutra lutra*) is protected under British and European law under the Wildlife and Countryside Act, 1981, the Nature Conservation (Scotland) Act, 2004 and under the Habitats Directive and the Habitats Regulations (see Section 1.2.2). It is also listed on Appendix 1 of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); Appendix 2 of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and as a globally threatened species on The World Conservation Union (IUCN) Red Data List. This makes it illegal to:

- intentionally or deliberately injure, kill or take an otter;
- deliberately disturb an otter;
- damage, destroy or obstruct access to an otter shelter (whether intentionally or not).

Bats
A bat survey was carried out in September and November 2006 to identify areas of potential bat interest that may be impacted for each of the sub-options which were reviewed in the Stage 2 appraisal (see Section 2.4). In general the area surrounding the scheme is intensively farmed arable fields with very few hedgerows or tree lines suitable for bats. No records of bats have been identified. A few small areas of woodland within the Menie Estate were identified as having potential interest for bats. These would not be affected by the scheme. The plantations at Dambrae and Aikenshill were considered too young to have foraging interest for bats. All seventeen species of bat native to the UK are protected under the Conservation (Natural Habitats etc) Regulations 1994 and the Conservation (Natural Habitats, &c) Amendment (Scotland) Regulations 2004, the Wildlife and Countryside Act 1981 and the Nature Conservation (Scotland) Act 2004. It is illegal to:

- intentionally or recklessly kill, injure or capture/take a bat;
- intentionally or recklessly damage, destroy or obstruct a bats place of shelter or protection (roost);
- intentionally or recklessly disturb a bat in its roost; and
- knowingly cause or permit any of the above offences to take place.

Water Vole
No water vole activity was found during the protected species survey. Water vole (*Arvicola terrestris*) is a Priority Species in the UK Biodiversity Action Plan[133] as well as being listed in the North East Biodiversity Action Plan[134]. Water vole is protected under the Wildlife and Countryside Act 1981 and the Nature Conservation (Scotland) Act 2004 and this means it is an offence to:

[133] Her Majesty's Stationary Office. Biodiversity: The UK Action Plan. 1994
[134] North East Biodiversity Steering Group Partnership. North East Scotland Biodiversity Action Plan. The Moray Council, 2000

- intentionally disturb a water vole in its place of shelter;
- intentionally to damage, destroy or obstruct water vole access to its shelter.

Badger

No badger setts are present within 30m of the proposed scheme, however the survey indicated that badgers are present along the route corridor. Badger activity recorded closest to the proposed scheme is within the woodland to the east of the existing A90 in the vicinity of Stoneyards and in the Menie Estate and north of Pitmillan Farm. In addition to this badger mortalities have occurred along the existing A90 at Balmedie, Orrock, Boghead, Delfrigs, Aikenshill and Fountainbleau, which suggests that their routes to foraging ground cross the road. Badgers are protected under the Protection of Badgers Act (1992) and the Wildlife and Countryside Act (1981) and subsequent Amendment (1985). This means it is an offence to wilfully kill, injure or ill-treat a badger. Under the Protection of Badgers Act (1992) (as amended by the Nature Conservation (Scotland) Act 2004) badger setts are also protected against obstruction, destruction, or damage in any part and the animals within the sett cannot be disturbed.

Birds

The breeding bird surveys carried out between mid June and the end of July recorded thirty-eight species of bird. Ten are on the Red list of Birds of Conservation Concern[135] and eight on the Amber list. Birds identified in plot affected by the proposals are included in Table 10.1. Information about the wider study area is included in Appendix 10.2.

Table 10.1: Birds of Conservation Concern in the Scheme Corridor

Red List Species
• Skylark
• Starling
• Linnet
• Song thrush
• Grasshopper warbler
• Bullfinch
• Yellowhammer
• Reed bunting
Amber List Species
• Kestrel
• Oystercatcher
• Lapwing
• Meadow pipit
• Dunnock
• Willow warbler
• Lesser redpoll

Plant Species

No important botanical records have been identified in the scheme corridor or in close proximity to it in consultation or by field survey.

[135] The Population Status of Birds in the UK Birds of Conservation Concern: 2002-2007 from Gregory et al, The Population Status of Birds in the UK, Channel Islands and Isle of Man: an analysis of conservation concern 2002-2007. British Birds, 95, 2002. Red list are those that are Globally Threatened according IUCN criteria; those whose population or range has declined rapidly in recent years; and those that have declined historically and not shown a substantial recent recovery. Amber list are those with an unfavourable conservation status in Europe; those whose population or range has declined moderately in recent years; those whose population has declined historically but made a substantial recovery; rare breeders; and those with internationally important or localised populations

North East Scotland Local Biodiversity Action Plan (LBAP) Habitats and Species

No priority habitats have been identified within the study area however several priority species have been identified. These are listed in Table 10.2.

Table 10.2: Priority Species

Priority Species	Recorded Location within the Route Corridor
Birds	
Bullfinch	In the mixed planting south of Kirkhill
Linnet	Throughout the route corridor
Reed Bunting	In arable fields east of Overhill and the Christmas tree plantation at Fornety
Skylark	Throughout the route corridor
Mammals	
Brown Hare	Brown hare sighted in the Pitmillan Farm area
Otter	Otter road mortalities have been recorded as far north as Foveran along the existing A90 and otter signs were recorded throughout the scheme area (see Section 10.5.4.1 and Confidential Annex)

10.6 ECOLOGICAL INTERESTS OF THE CORRIDOR

The majority of the corridor is of limited ecological value. Pasture fields (mainly improved) and some arable predominate but field boundaries are poor with only broken *Ulex europaeus* (gorse)[136] scrub and post and wire fences in many areas (see Target Note (TN) 31). In the south there are more stone walls but these are generally tumbled down and overgrown (see TN 9). The headlands of fields are not floristically rich.

Woodlands are limited in the area and particularly in the corridor of the proposals and few would be affected by construction. There are mixed shelterbelts near farms and other properties (for example TN18) and areas of recent planting (at Dambrae and Aikenshill (TNs 24 and 25) and Fornety (TN 42 and Photograph 24). The recent plantations are mainly coniferous (predominantly *Picea abies* (Norway spruce) and *Larix* spp (larches) with some deciduous species including *Acer pseudoplatanus* (sycamore), *Betula pendula* (silver birch), *Salix* spp (willows) and *Alnus* spp (alders). There are three ponds in the plantation at Dambrae. These have been quite recently dug and marginal vegetation is not well established (see TN 24). There is a small plantation near Hill of Menie Croft (TN 19) which is mainly *Salix* spp (willows), with some *Ulmus glabra* (wych elm) with a ground flora of ubiquitous grassland and herb species. The route would cross some lines of trees lining access roads and tracks to farms and isolated properties such as at South Orrock and Hill of Menie Croft (see TN 15 and 20).

A number of burns and ditches drain the area towards the sea (see Section 9.5.1). Some sections of the watercourses have been canalised through fields. The banks of most are poached by cattle unless they are well fenced. Wet loving species are scattered in less disturbed areas (see TNs 12 and 33). Species include *Phalaris arundinacea* (reed canary grass), *Juncus effusus* (soft rush), *Epilobium hirsutum* (great hairy willowherb), *Cirsium palustre* (marsh thistle) and *Filipendula ulmaria* (meadowsweet) with *Montia fontana* (blinks) on muddy banks.

The habitats in the study area provided limited cover and food resources for birds. The breeding bird survey registered 38 species. Species recorded

[136] Plant nomenclature follows Stace C, New Flora for the British Isles, Cambridge University Press, Cambridge, 2nd Edition. 1997

included kestrel, oystercatcher, lapwing, skylark, meadow pipit, linnet, and yellowhammer (see Section 10.5.4) and Appendix 10.2). All species are typical of the habitats and of the area although some are birds of Conservation Concern (see Section 10.5.4) but not all from the area of the proposals (see Appendix 10.2).

The otter survey indicated some otter movements in the area but that the watercourses generally provide poor food resources[137] which suggests that otter probably use the area as a source of fresh water or use it to pass through to more favourable habitat elsewhere. No signs of water vole were identified although all ditches and ponds were checked for activity.

No records of bats have been identified from consultation or by the bat survey. The bat survey indicated that the lack of mature trees, the dominance of conifers and the lack of marginal vegetation around the ponds at Dambrae suggested that the area would not be rich in invertebrates and that the lack of shelter in an exposed area would further not be good for invertebrates or their bat predators (see Photograph 13). No trees were identified which suggested they might be used as bat roosts. Although the area might be used by bats in the summer it does not represent prime habitat.

Old records of setts and badger road traffic fatalities indicated badger activity in the area of the proposals and the survey confirmed this. Discrete social groups of badgers were identified which exploit and defend territory of varying size and some demonstrate foraging, travel and territorial activity i.e. latrines (boundary markers) extending towards or across the existing A90.

10.7 ASSESSMENT METHODOLOGY

10.7.1 Introduction

The methodology which has been used for assessment of ecological effects is described in the following sections.

10.7.2 Methods of Prediction

An outline of the development proposals has been compared with the known information about the baseline ecology of the site in order to predict the potential ecological impacts which are likely to result from the scheme. In addition likely effects on habitats of known nature conservation importance in the vicinity of the scheme have been considered. The evaluation criteria set out in Section 10.7.3 have been used to consider the significance of potential impacts (see Section 10.8) and of residual effects after having taken agreed mitigation into account (see also Section 10.9 and 10.10).

10.7.3 Evaluation Criteria

The significance of ecological effects is assessed according to the following primary criteria.

- The magnitude of the effect, as determined by its intensity and by its extent in space and time. This takes into account:

[137] No significant fish interests have been identified by field survey or in consultations

  - the vulnerability of the habitat or species to the change caused by the development; and
  - its ability to recover.

- The value, in nature conservation and ecological contexts, of affected receptors including species, populations, communities, habitats and ecosystems.

Significance is determined by the interaction of these primary criteria, being high for large effects on receptors of high value, and lower for smaller effects on receptors of lower value.

Habitats are assessed according to the widely accepted criteria of which the most important are naturalness, extent, rarity and diversity. Existing statutory and non-statutory designations for the nature conservation importance and amenity value of the sites are also taken into consideration. In addition it is now generally considered that special importance be attached to ancient semi-natural habitats that depend for their survival upon traditional kinds of land management, for example, ancient coppice woodlands or meadows. These support special plant and animal communities that cannot be recreated quickly (if at all) and have suffered large reductions in the post-war period due to development and agricultural intensification.

Species are similarly assessed according to accepted criteria and the extent to which they are under threat. The importance of species to wider communities is considered. Protection of species by the relevant legislation including the Wildlife and Countryside Act, 1981, the Nature Conservation (Scotland) Act, 2004, and the Conservation (Natural Habitats &c) Regulations, 1994 and non-statutory regulations is taken into account.

Professional judgement is used by ecologists in the assessment of significance of effects. In this appraisal the criteria in the following tables have been used to help inform and guide the assessment[138].

Table 10.3: Criteria for defining the Importance of the Nature Conservation Resource

Value	Examples
International	Internationally designated or proposed sites including SACs; SPAs and Ramsar Sites; or sites which are not designated but meet the criteria for international designation e.g. sites supporting populations of internationally important species or internationally important numbers of species/assemblages
National	Nationally designated sites-SSSIs and National Nature Reserves or sites which are not designated but meet the criteria for national designation. Sites supporting viable populations of nationally important habitats and species as defined in the literature or by consultation
Regional	Sites designated for their recognised importance at regional level. Sites supporting UK BAP and/or LBAP habitats; viable breeding populations of regionally important species as defined in the literature or by consultation
Local	Undesignated sites but with habitats or species recognised as enriching local biodiversity
Negligible	Sites with little or no local biodiversity interest

[138] Informed by IEEM guidance and www.webtag.org.uk

Table 10.4: Criteria for determining the Magnitude of Impact

Magnitude of Impact	Guideline Criteria
Major negative	The proposal (either on its own or with other proposals) may adversely affect the integrity of the site, in terms of the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and / or the population levels of species of interest with long-term effects
Moderate negative	The site's integrity will not be adversely affected, but the effect on the site is likely to be significant in terms of its ecological objectives
Minor negative	Some minor negative impact – e.g. short-term disturbance but no permanent reduction in population size, habitat diversity or species-richness
Neutral	No detectable impact (+ or -)
Positive	Impacts which provide a net gain for wildlife

Table 10.5: Definitions of Levels of Significance of Effect

Significance	Definition	Guideline Criteria
Major	A fundamental change to ecological resources	Major impacts to resources of high value e.g. national or regional value
Moderate	A material but non-fundamental change	Moderate impacts to resources of regional or local value or minor impacts to a resource of high value
Minor	A detectable but non-material change	Limited impacts to resources of low (local or negligible) value
Neutral	No detectable change	Effects neutral
Positive	Improvement to baseline ecological conditions	Increase in nature conservation value

10.8 POTENTIAL IMPACTS

Nature conservation impacts that may result from the proposals include:

10.8.1 Permanent

- Permanent loss of habitat or species due to permanent or temporary landtake for the proposals;
- creation of barriers to the movements of animals, especially mammals, amphibians and invertebrates and plants with limited powers of dispersal by the permanent works;
- fragmentation of habitat or severance of ecological corridors between isolated habitats of ecological importance;
- alterations to drainage regimes which may affect adjacent habitats; and
- creation of new habitats and introduction of species as a result of reinstatement works, habitat enhancement proposals and landscaping.

10.8.2 Construction

- Disturbance or damage to adjacent habitat not required for the proposals through construction activities (movement of vehicles and personnel, artificial lighting, dust, spillage of fuels and chemicals, emissions and noise);
- disturbance to or displacement of wildlife in proximity to the site through construction activities including noise and vibration from piling activities;
- temporary severance of wildlife corridors;
- pollution containing high levels of sediment entering the watercourses and indirectly impacting on the Ythan SAC/SPA; and
- introduction of alien species during the construction works.

10.8.3 Operational

- Kills, disturbance or displacement of animals from increase in speed/volume of traffic;
- effects on wildlife from increased noise from the road;
- effects on wildlife from changes in night-time lighting conditions;
- effects from the discharge of site run-off which could be contaminated with oil, de-icing salts, heavy metals and suspended solids which could impact on water quality or adjacent habitats; and
- damage or disturbance to habitat or species adjacent to the proposals through operational activities.

10.9 MITIGATION MEASURES

EC1 Habitat loss would be restricted to that required for safe construction of the works.

EC2 New habitats created as part of the landscaping works for the scheme would be designed to enhance the biodiversity of the road corridor.

EC3 New tree planting (other than where specimen tree planting is identified in the Outline Landscape Design) would be with native species typical of the local area, obtained from local sources wherever possible.

EC4 The new ponds created as part of the site drainage would be designed to benefit nature conservation and new planting at their edge would be designed to enhance local biodiversity.

EC5 Culverts would be designed for wildlife in accordance with best practice.

EC6 The site would be checked for the presence of protected species prior to construction work beginning and appropriate mitigation measures would be discussed and agreed with SNH and implemented if any protected species were identified before or during construction.

EC7 The need for a licence[139] would be discussed with the Scottish Executive before construction (because of the potential for otter to cross the site) and if considered necessary a licence would be applied for from the Executive.

EC8 Specific measures to protect otters and badgers (fencing, culverts with ledges and tunnels) have been identified by the protected species expert and these would be included in the contract requirements. The detailed location would be finalised when the final scheme is defined with input from an appropriate expert.

EC9 All tunnels and culverts would be checked regularly when the scheme was operational by Transport Scotland's maintenance contractor to ensure fencing was in good condition and that no culverts or tunnels were blocked.

EC10 A pre-construction survey would be undertaken for protected species by an appropriate expert and if any new activity is identified further mitigation measures would be defined.

EC11 All trees and woodlands in proximity to the works but which do not require to be removed would be fenced off. Only essential tree loss would be permitted.

EC12 Any mature and dead trees would be checked by an appropriate expert for bats prior to removal and appropriate mitigation measures agreed with SNH and implemented if bats were found.

EC13 All woodland, scrub and other habitat would be checked for nesting birds before removal if this is programmed for the bird nesting season. If any are

[139] Where proposals have potential to affect European protected species a licence must be obtained from the Scottish Executive as described in European Protected Species, Development and the Planning System. Interim guidance for Local Authorities in licensing arrangements. October 2002, SEERAD

identified appropriate mitigation would be agreed with SNH and implemented. Wherever possible trees would be removed outwith of the breeding period.

EC14 Marginal vegetation from the edge of Dambrae ponds and the Foveran Burn would be used as a seed source for ponds created elsewhere on the site as part of the scheme drainage.

EC15 Any land degraded by construction would be restored after construction was completed.

EC16 Any surface water features[140] affected by the proposals would be made good unless destroyed by construction of the scheme.

EC17 Best site management practices would be implemented on site to minimise the risk of intrusion into adjacent habitats and the risk of pollution incidents which could affect neighbouring habitats.

EC18 Method statements would be drawn up by the contractor and those for activities which could affect the freshwater/marine environment would be agreed with SEPA to ensure all necessary pollution prevention measures were included within them.

EC19 The contractors would follow best practice including the relevant SEPA pollution prevention guidelines (see www.sepa.org.uk).

EC20 Detailed contingency plans would be developed by the contractors for implementation in case of spillage during construction.

EC21 Wooden ramps (or similar) would be placed in any excavations during construction with potential to trap animals to allow easy escape. Open trenches would be checked each day for entrapments.

EC22 Surface road run-off from the A90 would pass through sustainable urban drainage systems (SUDS) prior to discharge to a local watercourse.

10.10 ASSESSMENT OF RESIDUAL EFFECTS

10.10.1 Permanent

There would be no direct effects to any area designated for its nature conservation interests. These areas are all remote from the site (see Section 10.5.3).

Construction of the scheme would result in loss of habitat along the route corridor. For the purposes of this assessment it has been assumed that all vegetation would be lost within the land made available for construction (150.18ha). The site surveys did not indicate any habitat of particular nature conservation value in the scheme corridor and the loss is not considered to be significant. The majority of habitat which would be lost is improved grassland with only small areas of woodland much of which is immature. Wherever possible vegetation would be removed outwith the bird breeding period but where this was not possible checks would be made to ensure no breeding birds were affected. If any potential impacts were identified these would be discussed with SNH and appropriate mitigation designed and implemented. Small areas of species-poor marshy grassland would be lost adjacent to burns and in particular the Foveran Burn (see Photograph 19) but none was identified as being of more than local interest. There would be extensive new planting at the edge of the new road and junctions following the works. This has been designed to benefit local biodiversity in the longer term (including native tree and shrub species and wildflower

[140] Further mitigation relating to water and drainage is contained in Section 9.8

grassland) and would mitigate the loss of habitats in the longer term (see Section 11.7 and Figures 11.7a to g, Appendix 11.1).

Two of the three ponds at Dambrae would be lost but these are recently constructed and have not been identified as being of any significant nature conservation value. Eight new detention ponds would be created as part of the site drainage. The contractor would be required to follow best practice guidance[141] to ensure that the new ponds would be designed to benefit nature conservation in the longer term, including for use by otter. Such measures would include inlets and areas of different depth and areas of marshy grassland at their margins (see also Section 9.9.1).

A minor northern tributary of the Foveran Burn requires to be realigned to accommodate the works. The design of the new alignment would follow best practice guidance[142]. All watercourses affected by the works would be culverted under the works and culverts would be designed following best practice for wildlife[143]. None of the watercourses affected have been identified to be of more than local interest for nature conservation (apart from transient use by otter) and the effects are not predicted to be significant provided best management practices are implemented on site (see Section 10.9). The hydrological assessment (see Section 9.9.1) has indicated that hydrological effects would be limited in extent and the remnant raised bog situated east of the scheme (raised in consultation by SNH) would not be affected.

A summary of the key habitats lost and the new habitats that would be created is given in Table 10.6.

Table 10.6: Indicative Scheme Habitat Loss and Gain (ha)[144]

Habitat Type	Loss	Gain	Total +/-
Woodland (including: Plantation woodland and shrubs; Native woodland landscape planting)	11.82ha	12.76ha	**+0.94ha**
Mixed native and ornamental landscape planting	--	0.49ha	**+0.49**
Grassland	53.88ha	26.48ha	**-27.34ha**
Hedgerow	All degraded	2.81km	**+2.81km**
Hedgerow with trees	--	2.98km	**+2.98km**
Single trees (entrance to Balmedie)	--	14 trees	**+14trees**
Arable	40.39ha	16.8ha	**-23.59ha**
Total standing water	0.18ha	3.13ha	**+2.95ha**
• Existing Ponds	0.18ha	--	-0.18ha
• Detention Ponds	--	3.13ha	+3.13ha
TOTALS	106.27ha	59.66ha	-46.61ha

The field surveys indicated that otter and badger pass through the scheme corridor although no holts or setts were identified in close proximity to the corridor (see confidential report). Otter passes would be provided on the main culverted watercourses (see Section 3.2.2.3) to allow passage up and down the burns.

[141] For example, SUDS Manual and Site Handbook. CIRIA, 2007 and Ponds, Pools and Lochans, Guidance on Good Practice in the Management and Creation of Small Water Bodies in Scotland. SEPA, June 2000
[142] For example, Watercourses in the Community, A Guide to Sustainable Watercourse Management in the Urban Environment. SEPA, June 2000
[143] River Crossings and Migratory Fish: Design Guidance-a consultation paper. Scottish Executive, April 2000
[144] All habitat loss and gain figures are approximate and based on assumptions about the final scheme design and construction outlined in Chapter 3

Badger fencing would be included in the scheme design where key areas of activity have been identified to prevent mortality and badger tunnels would be provided to allow access to foraging areas which therefore would otherwise have been severed from setts by the A90(T). Animals would also be able to pass freely through the new farm underpass at Aikenshill. The proposed mitigation would ensure that any potential impacts to protected species were minor or not significant. The reduction in traffic on the A90 may result in reduced badger mortalities on that road. Records of mortalities are included in the Confidential Annex.

No bat records have been identified in the scheme corridor. Any mature or senescent trees which could potentially provide bat habitat would be checked before removal to ensure no bats were affected by construction without appropriate mitigation having been implemented.

The breeding bird survey indicated that although some species of Conservation Concern (see Table 10.1) were found to be breeding in or close to the scheme corridor that the local breeding populations would not be significantly affected by the development (see Appendix 10.2). The new woodland and scrub planting would have potential to benefit breeding birds in the longer term as it matures and provides new feeding and nesting habitats.

10.10.2 Construction

Construction activities would be confined to the minimum area required for the works. All construction activities would be undertaken in accordance with best practice and the contractor would be required to ensure all works were undertaken in accordance with best practice. The success of all protection and mitigation measures would be audited throughout the construction period by Transport Scotland representatives. If any measures were found not to adequately protect the environment they would be amended.

Some animals could be disturbed by construction activities and in particular piling and other noisy activities. These would be short term and experience elsewhere suggests that effects would be unlikely to be significant. Any open excavations which animals could not easily get out of would be capped or be ramped for easy exit at the end of each working day to reduce the potential for animals being trapped.

Traffic flows on some roads may increase during construction as a result of construction traffic accessing the site or short term diversions. This may increase the barrier effects of a particular road to some wildlife and increase in the risk of mortalities. It is assumed that usually the greatest increase in flows would be likely to happen during peak times and that most wildlife movements would be likely to be at night, and the effect is not considered to be significant.

Contractors would be required to draw up detailed method statements, following best practice, which indicate how watercourses would be protected from pollution during construction. These would include detailed contingency plans for implementation in case of spillage during construction. The importance of the Ythan Estuary would be described to all working on site and the importance of protecting the estuary from pollution stressed. SNH has raised during consultation (see Annex A) the vulnerability of the Ythan Estuary to nitrates which could lead to eutrophication and growth of weed mats (*Enteromorpha* species)

which could threaten invertebrates and therefore bird life which depends on them. There would be no appreciable source of nitrate during operation (see Section 9.9.3) but during construction additional run-off from earthworks for the scheme could increase levels of nitrate form fertilised soils. The estuary is at the closest point some 3km from the works. It is considered that early construction of cut-off ditches and implementation of all best management practices on site would reduce the risk of unnecessary run-off and would reduce the risk of additional nitrates reaching the estuary. These measures would ensure the European sites are protected and that there would be no effect on their integrity. The works are considered to be too distant to result in any disturbance effects to qualifying features.

Table 10.7: Residual Effects on European Sites

Information Relevant to the Appropriate Assessment	Residual Effects
Sands of Forvie SAC	
Description of the Qualifying Features of the SAC:	
▪ Decalcified fixed dunes with *Empetrum nigrum (priority feature)*	▪ No direct disturbance
▪ Embryonic shifting dunes	▪ No direct disturbance
▪ Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	▪ No direct disturbance
▪ Humid dune slacks	▪ No direct disturbance
Conservation Objectives: *To ensure for the qualifying habitats that the following are maintained in the long term:*	
▪ Extent of the habitat on site	▪ No direct effects on site
▪ Distribution of the habitat within site	▪ Control of run-off would ensure no effects on habitats
▪ Structure and function of the habitat	▪ No residual effects
▪ Processes supporting the habitat	▪ No direct effects on any processes supporting habitats
▪ Distribution of typical species of the habitat	▪ No direct or indirect effects
▪ Viability of typical species as components of the habitat	▪ No impacts to viability of species
▪ No significant disturbance of typical species of the habitat	▪ Works located some 3km away and disturbance would not be significant
Relevant Operations (i.e. those that could cause damage to the qualifying features)	
▪ Civil engineering	▪ No works in SAC
▪ Discharges (run-off from the road)	▪ Early construction of cut-off ditches and detention ponds and implementation and audit of success of best practice measures on site would reduce the risk of any significant effects from run-off. During operation run-off would be attenuated and if necessary controlled via the scheme detention ponds
Ythan Estuary, Sands of Forvie and Meikle Loch SPA	
Description of the qualifying features of the SPA:	
The area regularly supports:	
▪ Up to 1.7% of the Great Britain (GB) breeding population of little tern (Sterna albifrons)	▪ No direct disturbance or effects
▪ Up to 2.2% of the GB breeding population of common tern (*Sterna hirundo*)	▪ No direct disturbance or effects
▪ 4.3% of the GB breeding population of sandwich tern (*Sterna sandvicensis*)	▪ No direct disturbance or effects

Information Relevant to the Appropriate Assessment	Residual Effects
Over winter the area regularly supports: ▪ 6.6% of the population of pink footed goose (*Anser brachyrhynchus*) ▪ 22,817 waterfowl (an internationally important assemblage of birds)	 ▪ No direct disturbance or effects ▪ No direct disturbance or effects
Relevant Operations (i.e. those that could cause damage/disturbance to the qualifying features) ▪ Civil engineering	 ▪ No works in SPA
▪ Discharges (run-off from road)	▪ Early construction of cut-off ditches and detention ponds and implementation and audit of success of best practice measures on site would reduce the risk of any significant effects from run-off. During operation run-off would be attenuated and if necessary controlled via the scheme detention ponds

There would be a risk of alien species being brought to site by traffic etc during construction. This would be monitored as part of the landscaping checks and any invasive alien species dealt with immediately and in accordance with best practice.

Provided all the mitigation measures were implemented the nature conservation effects during construction are considered to be minor.

10.10.3 Operational

During operation of the road the main potential impacts are mortality to animals crossing the road and the risk of pollution of the Ythan Estuary through road run-off containing de-icer, oil etc entering burns or groundwater and reaching the SAC/SPA.

Where badger and otter activity has been identified, appropriate tunnels, culvert ledges and fencing would be incorporated into the scheme design to prevent access to the carriageway and reduce the risk of mortalities (see Section 10.10.1). Birds, invertebrates and other fauna using the habitats adjacent to the road could also become casualties. No particularly sensitive species have been identified and potential effects are considered to be minor (not significant).

The increase in noise along the new route could result in reduced densities of birds and other animals in areas adjacent to the road although this would be in part off set by the new planting which would create new habitats for birds and other fauna. It is also likely that most wildlife would become habituated to the regular noise from the road. The area has not been identified as one of particular value to wildlife and no species of note have been identified which it is considered could be particularly vulnerable to noise or air pollutants[145].

Some small areas of the corridor would be better lit than at present (see Section 3.2.2.9). This could cause disturbance to wildlife and changes to feeding habits etc but in time it is considered that species would become habituated to the change.

[145] The air quality assessment reported in Chapter 15 indicates effects would not be significant

All road run-off would be carried through filter drains to detention ponds along the scheme where pollutants would be filtered out prior to discharge into burns (see Section 3.2.2.6). The risk assessment (see Appendix 9.1 – 9.4 and Section 9.9) has indicated that there would be no significant risk of pollution once the scheme was operational and that run off would be adequately controlled to ensure that there was no risk of pollution to groundwater or of the burns to which drainage would discharge including those which drain to the Ythan. The detention ponds would be managed to ensure efficient attenuation of pollutants so some habitat could be disturbed or lost during maintenance.

De-icing salt may have some impact on new vegetation in proximity to the road corridor and there may be some selection towards salt tolerant species.

Disturbance from future maintenance operations, including noise and human presence would be temporary and restricted to the road corridor. Possible damage to habitats associated with watercourses and the detention ponds as a result of maintenance activities would be kept to a minimum through restricting access to the immediate areas of the works. Disturbance would be infrequent and no significant effects on wildlife are predicted.

10.11 SUMMARY

- No statutory designated sites would be directly impacted on by the proposals.
- The proposed scheme lies within 3km of the Ythan Estuary which is designated for its international nature conservation value. Implementation of best management practices during construction and design and implementation of effective drainage features including detention ponds and other SUDS measures would ensure that there were no significant indirect effects on the estuary.
- The qualifying features of the sites (Special Area of Conservation; Special Protection Area and Ramsar site) would not be affected by construction or operation of the scheme.
- No habitats or plant species of particular note have been identified in or in proximity to the route corridor. Generally the habitats along the route are common in the area and of limited nature conservation value. Their loss is not considered to be significant.
- Habitat creation includes approximately 12.8 hectares of native woodland and scrub planting; 26.5 hectares of grassland including some wildflower grassland; and eight new detention ponds (3.1 hectares) with associated wetland habitat.
- Badger and otter activity have been identified along the route corridor however otter are considered only to pass through and no badger setts have been located within 30m of the proposed scheme. Suitable mitigation would be implemented during construction and otter and badger passes and fencing would be incorporated into the detailed design of the scheme to reduce the potential for severance effects from the new road.
- A variety of birds have been identified as breeding in the scheme corridor or in proximity to it but no significant effects to any have been identified.
- The new landscape proposals have been designed to provide a range of habitats for birds and other animals and have potential to enhance local biodiversity in the longer term.

APPENDIX 10.1

PHASE 1 TARGET NOTES

Phase 1 Habitat Survey Target Notes for the A90(T)

Target Note Number	Location	National Grid Reference (NGR) NJ	Habitat Type	Description
1	Blackdog Rifle Ranges	962 154	Marshy grassland	Extensive area of poorly drained ground with frequent clumps of *Juncus* spp. Not affected by Easter Hatton Link
2	Millden Burn (where existing A90 dual carriageway crosses the burn)	962 163	Broad leaved plantation and scattered scrub	Burn affected by previous construction works (culverted and banks retained by gabions). Planting includes *Fagus sylvatica* (beech); *Alnus* sp (alder); *Fraxinus excelsior* (ash) and *Crataegus monogyna* (hawthorn). *Ulex europaeus* (gorse) well represented. Ground flora includes stand of *Petasites hybridus* (butterbur)
3	East Aberdeenshire Golf Club	962 168	Improved grassland and areas of woodland mixed planting	Golf course including driving range; golf course and associated woodland planting
4	West side of A90 at planned junction south of Balmedie	962 170	Culvert for unnamed burn (flows into Millden Burn) and surrounding habitat	*Arrhenatherum elatius* (false oat grass) with some *Heracleum sphondylium* (hogweed), *Equisetum arvense* (field horsetail) and *Anthriscus sylvestris* (cow parsley) around culvert mouth area. Adjacent fields sheep grazed
5	West side of A90 at planned junction south of Balmedie	962 170	Shelter belt and associated 'scrubby' vegetation	Shelter belt of *Picea abies* (Norway spruce) with row of *Populus tremula* (aspen) below the house. Occasional *Fagus sylvatica* (beech) and *Alnus spp* (alder). The scrubby/herb layer was dominated by *Rubus fruticosus agg* (bramble) and *Aegopodium podagraria* (ground elder) and *Cirsium* spp (thistles). Frequent *Ulex europaeus* (gorse). Woodland not well managed
6	Area of scrub adjacent to A90 to south of Balmedie	963 171	Patchy scrub on set aside grassland	Patchy scrub roadside planting with *Salix caprea* (goat willow), *Salix cinerea* (grey willow), *Alnus* sp (alder) with *Ulex europaeus* (gorse) and neutral grassland with ruderal species including *Aegopodium podagraria* (ground elder)
7	Immediately east of the proposed junction to the south of Balmedie	964 172	Set aside field	Covered with extensive *Dactylis glomerata* (cocksfoot) and *Arrhenatherum elatius* (false oat grass) grassland with some *Agrostis stolonifera* (creeping bent). *Holcus mollis* (creeping soft grass), *Holcus lanatus* (Yorkshire fog). Associated herbs include *Chamerion angustifolium* (rosebay willow-herb), *Rumex obtusifolius* (broad-leaved dock), *Cirsium arvense* (creeping thistle), *Senecio jacobaea* (ragwort), *Hypochoeris radicata* (cat's ear), *Anthriscus sylvestris* (cow parsley) and *Heracleum sphondylium* (hogweed). Scattered

Target Note Number	Location	National Grid Reference (NGR) NJ	Habitat Type	Description
				Ulex europaeus (gorse) close to the road
8	Unnamed burn (flows into Millden Burn)	960 172	Burn side	Patches of *Phalaris arundiacea* (reed canary grass) and *Juncus effusus* (soft rush) beside the burn. Scattered *Ulex europaeus* (gorse)
9	South of Keir Farm	959 173	Stone wall with gorse hedge	Patchy *Ulex europaeus* (gorse)
10	East of Balmedie in vicinity of Keir Farm	961 177	Shelter belt planting	Species include *Sorbus aucuparia* (rowan), *Quercus* sp (oak) and some conifers
11	Eigie Burn	963 177	Marginal vegetation to burn	Burn 1.5-2m wide. Occasional gabions stabilising the banks. Patchy *Ulex europaeus* (gorse) with the herb layer dominated by *Filipendula ulmaria* (meadowsweet), *Epilobium hirsutum* (great hairy willowherb), and *Stachys sylvatica* (hedge woundwort), *Cirsium palustre (*marsh thistle) and *Chamerion angustifolium* (rosebay willow-herb) and patches of *Arrhenatherum elatius* (false oat grass). Pasture fields adjacent
12	South of B977	963 183	Canalised watercourse	Margins dominated by *Arrhenatherum elatius* (false oat grass) grassland with *Juncus effusus* (soft rush) and tussocks of *Deschampsia cespitosa* (tufted hair-grass) with *Rumex obtusifolius* (broad-leaved dock)
13	Road (B977) south of Drumhead (in vicinity of Victoria Hall)	958 183	Hedge and improved grassland with mature shelterbelt plantation close by	Hedge with *Alnus glutinosa* (alder), *Corylus avellana* (hazel) and some *Ulex europaeus* (gorse) hedge bottom dominated by *Arrhenatherum elatius* (false oat grass) with few herbs. Shelterbelt woodland dominated by dominated by *Fagus sylvatica* (beech)
14	Old lane to Orrock Manse	964 192	Lane grassland margins, ditches and shelterbelt	Lane margins dominated by *Arrhenatherum elatius* (false oat grass) grassland with some *Filipendula ulmaria* (meadowsweet) and patches of *Rubus idaeus* (wild raspberry) together with *Ulex europaeus* (gorse) in the dry ditches and near the stone walls bordering the lane. Mature *Sorbus aucuparia* (rowan), *Fraxinus excelsior* (ash) and *Acer pseudoplatanus* (sycamore) border the lane. Rabbit activity frequent
15	Lane to South Orrock	964 189	Shelter belt	Line of *Picea abies* (Norway spruce)
16	South Orrock	966 191	Deciduous trees and	Mainly *Acer pseudoplatanus* (sycamore) with scattered *Ulex europaeus*

Target Note Number	Location	National Grid Reference (NGR) NJ	Habitat Type	Description
			shrubs	(gorse) near lane. Improved grassland field edges dominated by *Arrhenatherum elatius* (false oat grass) with some stone walls
17	Cock and Bull Pub	966 194	Shelter belts and improved grassland	Improved grassland (grazed) with line of *Acer pseudoplatanus* (sycamore) near pub. Field margins mainly stone walls
18	Orrock House Road	967 197	Arable fields and field margins	Field margins either post and rail or stone walls. Ditch by edge of road grass covered and dry in places. Occasional *Cytisus scoparius* (broom). Starlings and rooks. Orrock House shelterbelt dominated by *Acer pseudoplatanus* (sycamore). Meadow pipit sighted
19	East of Hill of Menie Croft	966 203	Small willow planting in line of planned route and field margins by lane	Small area of planting includes mainly willows – *Salix caprea* agg (goat willow) and *Salix cinerea* (grey willow) with occasional *Ulmus glabra* (wych elm) on the edge. The herb layer dominated by *Epilobium hirsutum* (great hairy willow-herb). The woodland is surrounded by improved grassland used as grazing pasture (cows grazing at time of visit) with *Lolium perenne* (perennial rye-grass) and *Trifolium repens* (white clover). Field edges and ditches (drain to Menie Burn) grassy and ruderal in character (poached by cattle where not fenced) *Anthriscus sylvestris* (cow parsley) was evident together in places with patches of *Aegopodium podagraria* (ground elder) and occasional *Montia fontana* (blinks), *Rumex obtusifolius* (broad-leaved dock) and *Sonchus asper* (sow-thistle). Groups of pied wagtails
20	Hill of Menie	967 203	Lane from Hill of Menie with shelterbelt	Line of *Picea abies* (Norway spruce) with *Arrhenatherum elatius* (false oat grass) dominated grassland beneath with *Rumex* spp (docks) and *Urtica dioica* (nettle). Rabbit warren in the bank beneath. Around Hill of Menie there is a shelterbelt of mature *Acer pseudoplatanus* (sycamore) with a mature hedge of *Fagus sylvatica* (beech) with some planted *Sorbus aria* (whitebeam). Buzzard, kestrel and carrion crow sighted
21	South of Stoneyards	965 208	Less improved pasture and plantation area	*Agrostis* spp (bents), *Festuca rubra* (red fescue), *Dactylis glomerata* (cocksfoot) and *Cynosurus cristatus* (crested dog's-tail) with *Lolium perrene* (rye-grass) grassland with *Juncus effusus* (soft rush) clumps in the wetter areas. Main trees in the plantation appear to be *Acer pseudoplatanus* (sycamore) and *Sorbus aucuparia* (rowan) together with some *Picea sitchensis* (sitka spruce).

Target Note Number	Location	National Grid Reference (NGR) NJ	Habitat Type	Description
				Buzzards further observed flying overhead
22	Looking south towards Wardhead	964 207	Improved grassland	Improved grassland grazed by horses. *Lolium perenne* (rye-grass) dominated with some patches of Cirsium arvense (creeping thistle), *Rumex* spp (docks) and *Chamerion angustifolium* (rosebay willow-herb). Some goldfinch; swallows flying overhead
23	South of Cowhill	963 208	Scattered deciduous trees with improved grassland	Occasional *Salix* sp (willow), *Acer pseudoplatanus* (sycamore), *Sorbus aucuparia* (rowan) and *Alnus* sp (alder) in this area with improved grassland all around
24	Road to west of Dambrae	965 207	Mix of shelterbelt with ponds and roadside ditch and grassland	Shelterbelt with *Larix europaea* (European larch) and species as TN 25, with occasional *Cytisus scoparius* (broom). *Dryopteris filix-mas* (male fern) in the ditch bottom. Frequent *Arrhenatherum elatius* (false oat grass) with *Chamerion angustifolium* (rosebay willow-herb) and *Juncus effusus* (soft rush). There are three quite recent ponds in the new plantings. These are immediately surrounded by tall grassland dominated by *Dactylis glomerata* (cocksfoot) and *Arrhenatherum elatius* (false oat grass) and other ruderals. The plantation looks about 3 to 5 years old. A buzzard and carrion crow seen flying overhead.
25	North of Dambrae	968 213	Plantation woodland	Plantation includes - *Picea abies* (Norway spruce) and *Larix europaea* (European larch) with *Acer pseudoplatanus* (sycamore), *Salix* spp (willows), *Betula pendula* (silver birch), *Alnus* sp (alder) and *Crataegus monogyna* (hawthorn). Herb layer dominated by tussocks of *Deschampsia cespitosa* (tufted hair-grass)
26	North of Delfrigs	969 213	Canalised watercourse (Sandend Burn)	Margins include *Arrhenatherum elatius* (false oat grass) together with *Epilobium hirsutum* (great hairy willow-herb), *Urtica dioica* (nettle), *Juncus effusus* (soft rush), and *Heracleum sphondylium* (hogweed). Some patchy gorse in the near vicinity. In the burn bottom there were small patches of *Callitriche* sp (starwort)
27	Kirkhill	966 225	Shelterbelt	Shelterbelt includes *Alnus glutinosa* (alder), *Sorbus aucuparia* (rowan), *Populus tremula* (aspen), occasional *Picea abies* (Norway spruce) and *Lonicera periclymenum* (honeysuckle) together with dense planting of *Salix* spp (willows) and pockets of *Crataegus monogyna* (hawthorn) and *Prunus spinosa* (blackthorn). Also some ornamental *Alnus sp* (alder) and *Sorbus sp* (whitebeam), together with shrubs including *Berberis* sp and *Cotoneaster* sp. The herb layer included some *Juncus effusus* (soft rush), *Urtica dioica*

Target Note Number	Location	National Grid Reference (NGR) NJ	Habitat Type	Description
				(nettle), occasional *Dryopteris felix mas* (male fern) and *Leucanthemum vulgare* (ox-eye daisy). Wood pigeons and rooks
28	Towards Aikenshill	968 222	Ditches	Ditches dominated by *Juncus effusus* (soft rush). Scattered *Salix* spp (willows) and scattered *Ulex europaeus* (gorse). Kestrel sighted
29	Junction with track to Overhill Farm	968 223	Grassy ditch	Small grassy ditch at edge of road with *Dactylis glomerata* (cocksfoot), *Arrhenatherum elatius* (false oat grass), *Poa* spp (meadow grasses). Herbs include - *Urtica dioica* (nettle), *Lathyrus pratensis* (meadow vetchling), *Galium aparine* (goosegrass), *Epilobium* spp (willowherbs), *Achillea millefolium* (yarrow), *Cirsium arvense* (creeping thistle), *Rumex acetosa* (common sorrel), *Vicia cracca* (tufted vetch), and *Anthriscus sylvestris* (cow parsley). Surrounding fields grazed with poor hedges (scattered *Ulex europaeus* (gorse)
30	West of Rashiereive	972 225	Planted hawthorn hedge	Hedge includes *Crataegus monogyna* (hawthorn), *Corylus avellana* (hazel), and *Prunus spinosa* (blackthorn). Hedge is overgrown with grasses and ruderals (mainly *Arrhenatherum elatius* (false oat grass) and *Heracleum sphondylium* (hogweed) and not thriving. Arable field adjacent with post and wire fence
31	North of Rashiereive	971 234	Arable field with post and wire fence	*Arrhenatherum elatius* (false oat grass) dominated grassland at the field boundaries
32	Pitgersie Bridge, Foveran		Marshy grassland at edge of Foveran Burn	Marshy grassland bordering the burn and to adjacent field (electric fence prevents grazing) including - *Dactylis glomerata* (cocksfoot), *Arrhenatherum elatius* (false oat grass) and *Phalaris arundinacea* (reed canary grass), together with flowering species such as *Heracleum sphondylium* (hogweed), *Urtica dioica* (nettle),*Centaurea nigra* (hardheads), *Lathyrus pratensis* (meadow vetchling), *Chamerion angustifolium* (rosebay willowherb), *Filipendula ulmaria* (meadowsweet), *Lathyrus pratensis* (meadow vetchling), *Galeopsis tetrahit* (common hemp-nettle) and *Mentha aquatica* (water mint). Some garden waste evident together with garden escapes including *Rheum* x *hybridum* (rhubarb) and *Spiraea* sp. Clumps of *Juncus effusus* (soft rush)
33	Oldmill Croft	974 244	Small plantation/shelterbelt	Small deciduous plantation surrounding the cottages. Quite a young plantation (< 5years) included the following species – *Alnus glutinosa* (alder), *Salix* spp (willows), *Betula pubescens* (silver birch), and *Acer pseudoplatanus* (sycamore).

Target Note Number	Location	National Grid Reference (NGR) NJ	Habitat Type	Description
				Swallows and house martins observed flying and feeding over nearby fields together with a pair of goldfinches
34	Pitmillan Farm	980 247	Shelterbelt	Deciduous shelterbelt around farm with *Acer pseudoplatanus* (sycamore), *Fraxinus excelsior* (ash), *Picea abies* (Norway spruce) and *Sambucus nigra* (elder). Field margins include a variety of ruderal species including *Tripleurospermum inodorum* (scentless mayweed) and M*atricaria matricarioides* (pineapple weed)
35	Road to Pitmillan Farm	975 248	Tarmac road with no formal boundaries	Arable fields each side
36	North of Pitmillan	976 252	Small field ditch	Ditch quite dry and dominated by grasses mainly *Dactylis glomerata* (cocksfoot) and *Arrhenatherum elatius* (false oat grass)
37	Junction area	976 257	Open tarmac area and field edges, post and wire fencing. A store of bales and soil piles evident	Grassland by road dominated by *Dactylis glomerata* (cocksfoot), *Arrhenatherum elatius* (false oat grass), *Poa* spp (meadow-grasses) with *Heracleum sphondylium* (hogweed), *Trifolium repens* (white clover), *Polygonum maculosa* (redshank), *Hypochoeris radicata* (cat's ear), *Taraxacum officinale* (dandelion) and scattered *Ulex europaeus* (gorse). House sparrows observed feeding
38	Old road at Fountainbleau - road margin	975 257	Scattered trees with neutral grassland	Grassland by road dominated by *Dactylis glomerata* (cocksfoot), *Arrhenatherum elatius* (false oat grass). Scattered *Picea abies* (Norway spruce) and *Ulex europaeus* (gorse).
39	Junction at Fountainbleau	975 258	Grassy verge with line of trees behind and associated ditch	Tree line composed mainly of *Picea abies* (Norway spruce). Grasses dominated by *Dactylis glomerata* (cocksfoot), *Arrhenatherum elatius* (false oat grass) with herbs including *Centaurea nigra* (hardheads), *Lolium uliginosus* (greater birdsfoot trefoil), *Leontodon autumnalis* (autumn hawkbit) with clumps of *Juncus effusus* (soft rush) in the ditch.
40	Bridgend (Tipperty) adjacent to B9000	973 262	Improved grassland (sheep grazing)	*Lolium perenne* (rye-grass) dominated grassland with *Cynosurus cristatus* (crested dog's tail), *Poa* spp (meadow grasses), *Agrostis* spp (bents), *Festuca rubra* (red fescue), *Dactylis glomerata* (cocksfoot). Evidence of rabbits
41	Bridgend (Tipperty) adjacent to B9000	969 265	Old grass covered lane with small copse	Grassy lane with small copse of mainly *Ulex europaeus* (gorse), *Cytisus scoparius* (broom) and *Acer pseudoplatanus* (sycamore) and one *Fraxinus excelsior* (ash)

Target Note Number	Location	National Grid Reference (NGR) NJ	Habitat Type	Description
42	Bridgend (Tipperty) adjacent to B9000	969 263	Trees and shrubs with improved grassland	Sparse, windblown *Acer pseudoplatanus* (sycamore), *Sorbus aucuparia* (rowan) and *Ulex europaeus* (gorse) with *Lolium perenne* (perennial ryegrass) dominated amenity grassland at the road edge
43	Fornety	975 263	Christmas tree plantation	Extensive area of *Picea abies* (Norway spruce) with small patches of deciduous tree planting, also around edges, including *Betula pendula* (silver birch) and *Quercus* spp (oaks). Herb layer included *Chamerion angustifolium* (rosebay willow-herb), *Vicia sepium* (bush vetch), *Achillea millefolium* (yarrow) and the grasses *Dactylis glomerata* (cocksfoot), *Arrhenatherum elatius* (false oat grass) and *Holcus lanatus* (Yorkshire fog)
44	Tarty Burn	975 269	Marginal vegetation	Burn 1.5-2m wide with stoney, silty bottom. Marginal vegetation including *Phalaris arundinacea* (reed canary grass), *Heracleum sphondylium* (hogweed), *Urtica dioica* (nettle),*Centaurea nigra* (hardheads), *Lathyrus pratensis* (meadow vetchling), *Rumex* spp (docks), *Rubus fruticosus* agg (bramble), *Chamerion angustifolium* (rosebay willow-herb), *Dactylis glomerata* (cocksfoot) *Equisetum arvense* (field horsetail). *Cladophora glomerata, Fontinalis antipyretica* and diatom species evident in river indicating eutrophic conditions

APPENDIX 10.2

A90 UPGRADE TIPPERTY – BALMEDIE

BREEDING BIRD SURVEY

JUNE – JULY 2006

Jon Hardey
MSc. ClBiol. MIBiol

Introduction

A survey of the birds breeding within 0.5km of the proposed routes for the upgrade of the A90 between Tipperty and Balmedie (Appendix 1) was commissioned in mid June, 2006. Twelve survey plots were established. The breeding bird population of each plot was assessed by territory mapping. Any additional records of non breeding birds were recorded.

Methods

Survey Methods

The survey area was within 0.5km of the route options (Appendix 1) between mid June and the end of July. Twelve survey plots (Table 1, Appendix 2) were chosen to sample the whole and to include areas of potential ornithological interest, woodland and ponds, which were located from ordinance survey maps.

Table 1. Survey Plots, Tipperty-Balmedie, 2006
(map references are approximately central in the plot)

Plot	Name (map reference)	Description
1	Blairton NJ968190	farmland (mixed, mostly arable)
2	Orrock Wood NJ962196	wood
3	Boghead NJ966200	farmland (livestock)
4	Menie Plantation NJ972202	young deciduous plantation
5	Menie Ponds NJ974206	ponds, woods and livestock farming
6	Dambrae NJ969207	wood (round entrance gate and house)
7	Stoneyards NJ966213	young conifer plantation
8	Cothill NJ976218	farmland (arable, including set aside)
9	Kirkhill NJ964224	young wood (beside house)
10	Blairythan NJ968231	farmland (arable)
11	Pitmillan NJ975246	farmland (arable)
12	Fornety NJ976258	young conifer plantation

The size of the plots was determined by the size of the landscape feature (wood, pond) and the narrowness of the survey area. The farmland plots were 25ha in area and were square to minimise edge effects. Permission for all survey plots were obtained from the relevant landowner. No surveys were carried out next to occupied dwellings without consent.

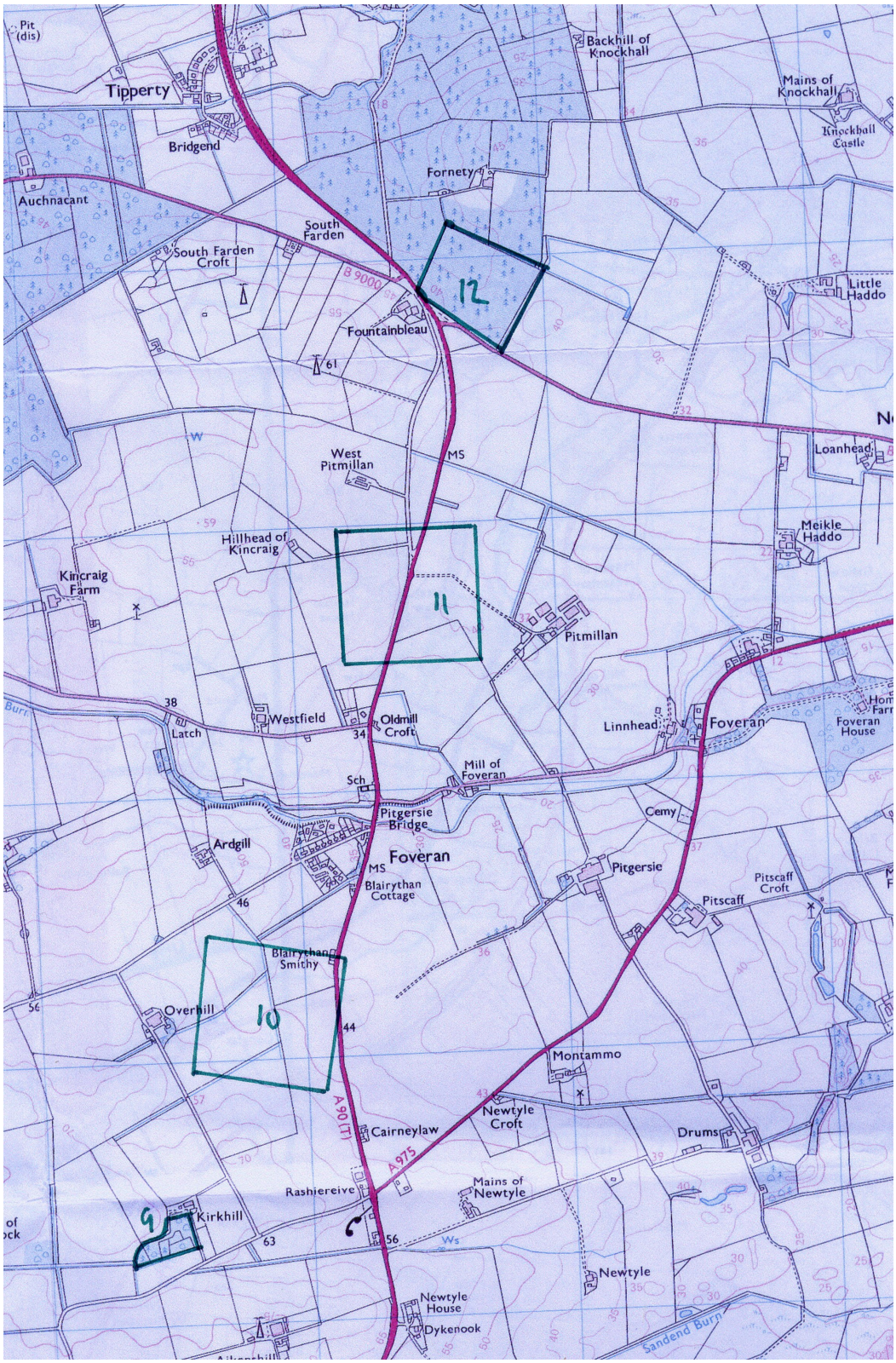


Figure 1: Survey Plots North of Newtyle

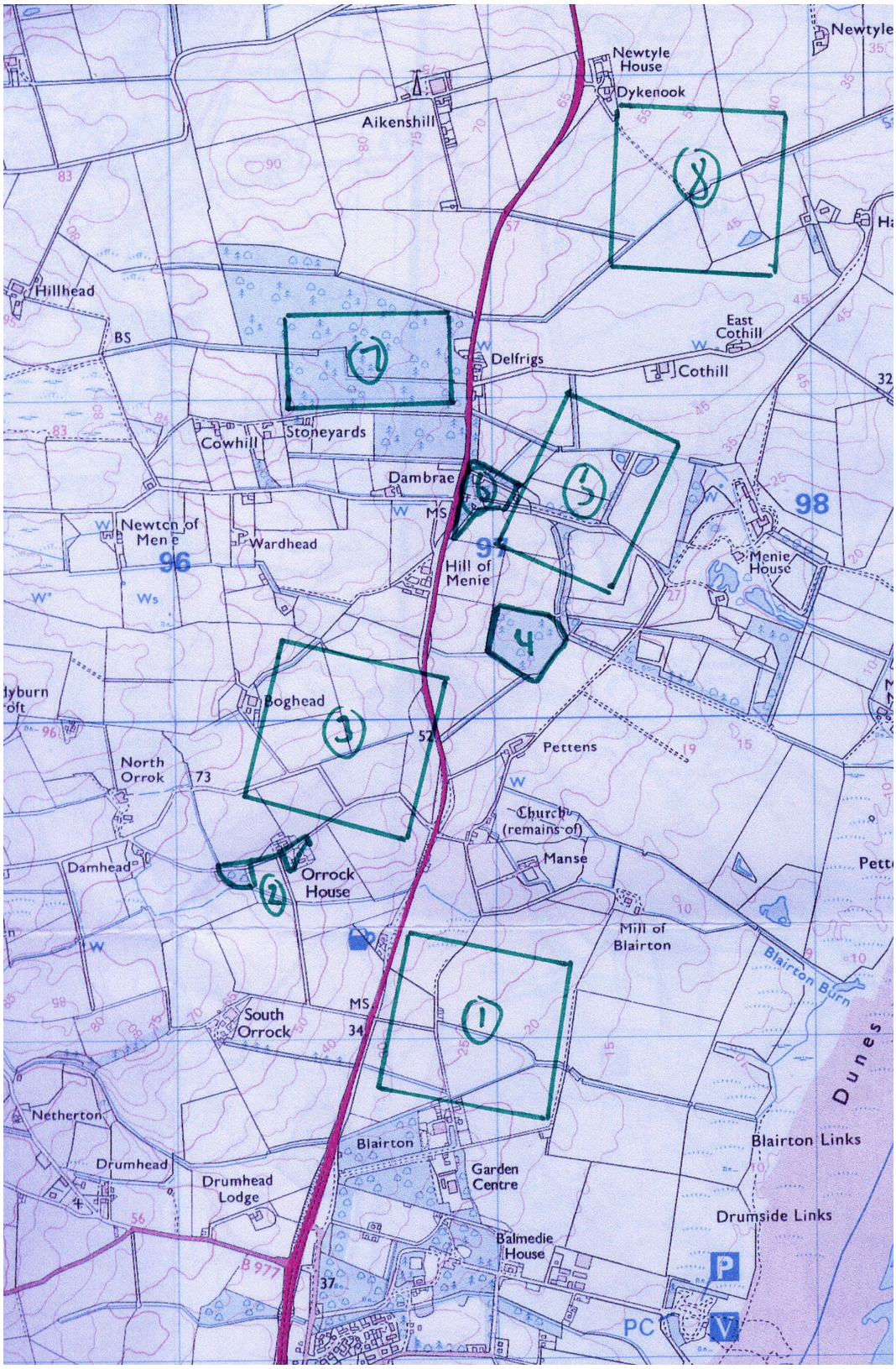


Figure 2: Survey Plots South of Newtyle
Map reproduced under licence (© Crown copyright All rights reserved Licence number AL 100035817)

Each survey plot was visited on three occasions (Table 2). The visits were started between 04.30 and 09.00 in the morning or between 18.00 and 21.00 in the evening. These times covered the most active times for breeding birds (Gilbert et al. 1998). The majority of visits were made in the morning with only a maximum of one evening visit was carried out on each plot (Table 2). Consecutive visits to a plot were at least a week apart. The location of all birds observed was recorded on a plot map (Bibby et al. 2000) with notation of their behaviour using the British Trust for Ornithology (BTO) standard conventions (Marchant 1983). The plots were walked at a slow pace in order that all birds could be identified and recorded with the observer stopping when necessary to identify the location of particular birds. When possible, the plot was covered by transects100m apart. In fields with growing crops or vulnerable stock, the edge of the field was walked. Rides were used in young plantations. In more closed habitats, woods, the transects were 20m apart. No attempt was made to survey birds near occupied buildings. Hirundines, pigeons, crows and gulls were not recorded as these birds fed over large areas. The bird registrations from each visit were analysed to identify the number of probable territories. Territories at the edge of the plot were recorded if 2 of the registrations were within the plot. This follows the International Bird Census Committee's (1969) recommended convention.

Table 2 Dates and Times of Plot Visits (June-July 2006)

Plot	Date and Time of Visit		
	Visit 1	Visit 2	Visit 3
1	21/6 17.15-17.55	28/6 05.10-05.55	23/7 07.50-08.30
2	21/6 18.10-18.40	28/6 06.20-06.55	23/7 06.30-06.55
3	21/6 18.50-19.30	28/6 07.10-07.50	23/7 07.10-07.35
4	23/6 07.20-07.55	10/7 07.35-08.10	25/7 07.45-08.05
5	23/6 06.30-07.10	10/7 06.40-07.30	25/7 06.55-07.40
6	23/6 05.50-06.25	10/7 06.00-06.35	25/7 06.15-06.50
7	22/6 07.15-08.10	12/7 06.30-07.40	24/7 08.15-09.20
8	21/6 08.55-09.46	11/7 06.15-07.30	24/7 06.50-07.30
9	22/6 05.15-06.05	12/7 05.25-06.10	21/7 06.40-07.10
10	21/6 07.35-08.15	30/6 05.50-06.40	21/7 07.15-08.15
11	21/6 06.40-07.20	30/6 06.50-07.30	21/7 06.50-07.30
12	22/6 18.15-19.05	13/7 06.20-07.30	21/7 08.40-09.25

Assessment Criteria

The magnitude of the impact of the development on each species (SNH 2000) is also determined (Table 3). This is placed in context with the species significance nationally, regionally or locally. The overall impact of the development is then evaluated. The effect can be further defined as direct (caused by the development) or indirect (involving at least one intermediary factor). It may also be negative (detrimental to the conservation of the species by reducing its viability) or positive (enhancing the species' conservation by improving its viability).

Conservation Status

Birds were also classified against their national and local conservation status. Nationally, conservation agencies have identified species of bird (Gregory et al. 2002), which are of conservation concern within the UK (http://www.jncc.gov.uk/species/Birds/PosB/red-list_htm). Forty species which are of the highest conservation concern, are red-listed. They have met set criteria for inclusion in the red list. Red list criteria are -

i) Globally threatened
ii) Historical decline in UK breeding population during 1800-1995 or rapid (>50%) decline in UK breeding population over last 25 years
iii) Rapid (>50%) in UK breeding range over last 25 years.

These criteria reflect national UK trends and may not be applicable to local populations. The birds on the red list may still be locally common despite their national population decline.

Table 3: Definitions of Magnitude of a Development on a Bird Population (SNH 2000)

Magnitude	Description
High	Total loss or major alteration to key elements/features of predevelopment baseline conditions so that post development character/composition/attributes of baseline will be fundamentally changed
Medium	Loss or alteration to one or more key elements/features of predevelopment baseline conditions so that character/composition/attributes of baseline will be partially changed.
Low	Minor shift away from predevelopment baseline conditions. Changes from the loss/alteration will be discernible but underlying character/composition/attributes of baseline condition will be similar to predevelopment circumstances/patterns
Negligible	Very slight change from predevelopment baseline conditions. Change barely distinguishable, approximating to 'no change' situation

An additional 121 species are amber listed. These are of unfavourable conservation status. Criteria for the amber list are :-

i) Unfavourable conservation status within Europe
ii) Historical population decline during 1800 – 1995 but recovering (population doubled in last twenty years) or moderate decline (25-49%) in UK over last 25 years.
iii) Moderate contraction (25-49%) of Uk breeding range in last 25 years.
iv) Small (!-300 breeding pairs) or localised (more than 50% of population in 10 or fewer sites)
v) Less than 20% of European breeding population in UK.

The local status of the birds was taken from 'The Birds of North-East Scotland' (Buckland et al. 1990) and the '2003 North-East Scotland Bird Report' (North-East Scotland Bird Club 2004).

Results

Table 4: Territories occupied by Pairs of Breeding Birds in Study Plots (June-July 2006)

Species	Survey Plot											
	1	2	3	4	5	6	7	8	9	10	11	12
Sparrowhawk	Y					Y						
Buzzard	Y	1	Y		Y							
Kestrel							Y					
Grey Partridge								Y				
Moorhen					1							
Oystercatcher										1		
Lapwing			1									1
Greater Spotted Woodpecker		1										
Skylark	1		2					6		4	7	3
Meadow pipit			Y		Y		Y	Y		Y		5
Pied Wagtail			1									
Wren	1	1		1		1	1	1	2			
Dunnock		1		2	2	2	2	1	2			2
Robin	1				1				2			
Blackbird	2	2			2	2	3				1	1
Song Thrush	1	1			2	2	2		1			1
Grasshopper Warbler							1					1
Sedge Warbler	3			2	6		7	2		6	2	4
Whitethroat					1			1				
Blackcap		1							1			
Willow Warbler		2		3			7		4			
Goldcrest		Y			Y							
Blue tit		Y		Y	Y	Y			Y			
Great Tit		Y			Y	Y			Y			
Coal Tit		Y			Y							
Treecreeper		1										
Starling	Y		Y		Y	Y	Y	Y	Y	Y	Y	Y
Magpie		Y							Y			
Tree Sparrow		Y							Y			
House Sparrow						Y			Y			
Chaffinch		2		4	6	3	7		4			
Greenfinch		1										
Goldfinch				1								
Bullfinch									Y			
Lesser Redpoll						Y	3					1
Linnet	1	Y		2			7	Y	2	Y	2	2
Yellowhammer	1	1		1	2	1	5	1		3		2
Reed Bunting					2		1			1		1

(Y denotes birds present but territories/pairs could not be verified)

A total of thirty-eight species were recorded in the twelve sample plots (Table 4). Breeding was recorded if

i) males had been registered singing

ii) birds alarm called
ii) birds were observed carrying food or feeding recently fledged young
iv) young were seen

Eleven were recorded as present in the plots but were not shown to be breeding. This was due in part to the late date of the survey when many local resident birds had bred, and fledged broods were recorded moving through the plot. Of the thirty-eight species recorded, ten are listed on the red list and eight on the amber list of birds of conservation concern.

Discussion

The late date of the start of the survey will have affected the results. Many locally resident species (waders, thrushes, tits) will have stopped breeding. These may have left the area or be present as flocks of feeding adults and juveniles. Some birds will have been excluded by the growing crops. Skylarks, for example, which establish territories in oilseed rape, tend to desert these territories as the crop matures. Other local residents, finches and buntings will still be obvious as they breed later in the season (Cramp & Perrins 1994). Migrants, although still present, may also have stopped displaying, especially isolated pairs. The figures given in Table 4 must be regarded as minima. All birds remaining in the plots should be detected during the three visits. It should be noted that the species found in the farmland plots are dependent on the crop. This has more effect on breeding birds than any other factor. Sedge Warblers (*Acrocephalus schoenobaenus*) can be abundant in oilseed rape while few birds will be found in fields grazed by cattle.

Species of Conservation Concern

(Data are provided in Table 4)

Kestrel *Falco tinnunculus*
National – Amber
Local – Common Resident
Kestrel are declining nationally and are believed to be declining locally.
A single Kestrel was recorded in plot 7. The development will have little affect on Kestrels locally.

Grey Partridge *Perdix perdix*
National - Red
Local – Locally common
Grey Partridge have declined nationally and locally. In North-east Scotland, the population is recovering.
A covey of four birds was recorded by the pond in plot 8. This is to the east of the proposed routes. The development will have little impact on Grey Partridges.

Oystercatcher *Haematopus ostralegus*
National – Amber
Local – Common Breeder
Nationally Oystercatchers have a restricted breeding distribution.
Single pairs were recorded breeding in two plots. It is possible that other pairs bred but had moved before the survey began. The proposed development will have no effect on the local Oystercatcher breeding population.

Lapwing *Vanellus vanellus*
National – Amber

Local – Common Resident
Locally and nationally, Lapwings have declined.
Single pairs were recorded breeding in two plots. It is possible that other pairs bred but had moved before the survey began. The proposed development will have no effect on the local Lapwing breeding population.

Skylark *Alauda arvensis*
National – red
Local – Common Resident
Nationally, Skylarks have rapidly declined. Locally, there is no evidence of a decline.
Skylarks were under recorded during the survey. The number of singing males is lower later in the season than earlier, with the majority of males no longer singing by late July (Donald 2004). Males also stop singing as their territories are abandoned as crops, especially oilseed rape, mature and the larks are excluded from the crop. Given the extent of available breeding habitat, the road development will have little effect on the population.
Several fledged broods were recorded.

Meadow Pipit *Anthus pratensis*
National – Amber
Local – Common Resident
Nationally, Meadow Pipits have declined. Locally, there is no evidence of a decline.
Meadow Pipits were under recorded during the survey as many had stopped breeding. Several fledged broods were recorded. Given the extent of available breeding habitat, the road development will have little effect on the population.

Dunnock *Prunella modularis*
National – Amber
Local – Common Resident
Nationally, the Dunnock population has suffered a moderate decline. Locally, there is no evidence of a decline.
Dunnocks were recorded breeding in eight plots. The road development will have little effect on the population.

Song Thrush *Turdus philomelos*
National – Red
Local – Common Resident
Nationally, the Song Thrush population has suffered a severe decline. Locally, there is no evidence of a decline.
Song Thrushes were recorded breeding in seven plots. Most of these will not be affected by the route options. The road development will have little effect on the population.

Grasshopper Warbler *Locustella naevia*
National – Red
Local – Uncommon summer visitor
Nationally, Grasshopper Warblers have declined severely over the last 25 years. Locally there is little evidence of a decline but the species is difficult to record (Cramp & Brooks 1992).
Grasshopper Warblers were recorded breeding in two plots. Plot 7 is between route options 1 and 5 and will not be affected. Plot 12 lies close to Foveran Farm

near Tipperty and option 1 passes just above the wet area where the warbler was recorded. This wet area should be left intact if possible. The development will, however, have little affect on the Grasshopper Warbler population in North-East Scotland.

Figure 3: Plot 12. The Grasshopper warbler bred in the damp grassland in the centre of the plot.

Willow Warbler *Phylloscopus trochilis*
National – Amber
Local – Common Summer visitor
Nationally, Willow Warblers have suffered a moderate decline. Locally, there may have been a decline although there is no clear evidence.
Willow Warblers were recorded breeding in five plots. Most of these will not be affected by the route options. The road development will have little effect on the population.

Goldcrest *Regulus regulus*
National – Amber
Local – Common Resident
Goldcrests have suffered a moderate decline nationally. Locally, there is no evidence of a decline.
Goldcrests were recorded from two plots. The road development will have no effect on the local population.

House Sparrow *Passer domesticus*
National – Red
Local – Common Resident
House Sparrows have declined severely nationally, particularly in urban environments. Locally, there is no evidence of a decline.
House Sparrows were recorded in two plots, both near occupied houses. The road development will have no effect on the local population.

Starling *Sturnus vulgaris*
National – Red
Local – Common Resident
Starlings have declined severely nationally. Locally, there is no evidence of a decline.

Starlings were recorded feeding or passing over ten plots. The road development will have no effect on the local population.

Lesser Redpoll *Carduelis flammea*
National – Amber
Local – Common Resident
Nationally. Lesser Redpolls have declined moderately. Locally, there is no evidence of a decline.
Lesser Redpolls breed in loose clusters with several pairs breeding close to each other (Newton 1972, Cramp & Perrins 1994). They were recorded breeding in two plots with birds seen in a third. The road development will have no effect on the local population.

Linnet *Carduelis cannabina*
National – Red
Local – Common resident
Nationally, Linnets have declined severely over the last 25 years. Locally there is little evidence of a decline.
Like other cardueline finches, Linnets breed in loose clusters with several pairs breeding close to each other (Newton 1972, Cramp & Perrins 1994).
Large areas of suitable habitat will not contain breeding pairs which will congregate in a few sites. Linnets were recorded breeding in six plots with birds seen in another three. The main breeding location was plot 7 which will not be affected. The road development will have no effect on the local population.

Bullfinch Pyrrhula pyrrhula
National – red
Local – Common Resident
Nationally, Bullfinches have declined severely over the last 25 years. Locally, there may have a decline although there is no clear evidence.
A single pair of Bullfinches was seen feeding in one plot. The road development will have no effect on the local population.

Yellowhammer *Emberiza citrinella*
Nationally – Red
Local – Common Resident
Nationally, Linnets have declined severely over the last 25 years. Locally there is no evidence of a decline. Yellowhammers are abundant breeding birds in farmland across North-East Scotland. Yellowhammers were recorded breeding in nine plots. The road development will have no effect on the local population.

Reed Bunting *Emberiza schoeniculus*
National - Red
Local – Common Resident
Nationally, Reed Buntings have declined severely over the last 25 years. Locally, there may have a decline although there is no clear evidence.
Reed Buntings were recorded breeding in four plots in damp or wet areas.
Only one is threatened by the development (plot 8). The road development will have little effect on the population.

Impact of the Development

The magnitude of the effect of the development (SNH 2000) is negligible (Table 3). The proposed routes will not have a detrimental effect on local bird populations. Three plots are of higher conservation concern. Plot 2 is not threatened by any of the routes. This small plot (less than 1ha) has a highly diverse breeding bird population. Steps should be taken to protect this site. Plot 7 is a young plantation between route 1 and 5. This supports larger numbers of breeding cardueline finches (Linnet, Lesser Redpoll) and Grasshopper Warbler. The wet grassland in plot 12 (fig. 3) supports a diverse number of breeding birds including Grasshopper Warbler. If possible, it should be preserved when route 1 is built near to Tipperty.

Conclusions

The Proposed routes will have a negligible effect on the local bird populations. Three survey plots are identified as being of higher conservation value than the others.

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11 LANDSCAPE AND VISUAL

11.1 INTRODUCTION

This chapter considers the landscape and visual effects of the proposals. It describes the existing landscape of the road corridor, discusses the sensitivity of the area to development and defines the extent to which the proposals would be visible both in the short and the long term.

Proposals to mitigate the potential impacts of the proposed scheme were developed as the landscape and visual assessments were carried out. The mitigation includes landform and planting proposals and, where appropriate, controls on the design development of the road geometry by a future design and build contractor. The assessments are based on the complete outline scheme design including the mitigation proposals.

The landscape assessment considers the changes to the fabric and character of the landscape likely to result from the proposed scheme, whilst the visual assessment is concerned with the actual views that are available to people affected, and their perception and responses to changes in these views.

Landscape and visual impacts can be beneficial or adverse, and how they are considered can depend on the attitude of the observer or assessor. The impact of introducing a new road is normally considered to be of an adverse nature. Beneficial effects may arise in some areas where the introduction of a new road allows the removal or reduction in size of an existing road, or the removal of substantial amounts of traffic from it.

The methodology used in the assessment is set out in Section 11.5.

11.2 SOURCES OF INFORMATION

Information has been gathered primarily from a structured site survey but also by desk study and from consultations with relevant consultees.

Preliminary assessment was undertaken, and initial mitigation proposals developed, in site visits over the summer of 2006.

Detailed landscape and visual site survey work was carried out in the early autumn of 2006 (while the leaves were still on the trees) and in early winter when visibility was at a maximum. The field survey was designed to collect data for both the landscape and visual impact assessments, and therefore covered:

- landscape character;
- topography;
- vegetation of landscape value;
- areas of important features of cultural heritage or local importance;
- visual receptors[146]; and
- identification of possible mitigation measures for discussion with the team.

[146] Properties (residential and commercial); not vehicular access routes (see also Section 11.5.1)

Relevant publications that have been taken into consideration include:

- Aberdeenshire Local Plan including Appendix 5 (Landscape Design Guidance) (adopted 2006); and
- South and Central Aberdeenshire: Landscape Character Assessment[147].

11.3 CONSULTATIONS

Consultations about the landscape and visual impacts of the scheme have been undertaken with Aberdeenshire Council and Scottish Natural Heritage (SNH). The main points arising from these consultations were:

- to highlight local landscape designations that indicate the sensitivity of the area (SNH, 2005 and Aberdeenshire Council, 2006);
- the visual relationship between the more undulating land to the west and the flatter coastal zone to the east, and the effect that the new road and its earthworks could have on views between these zones (SNH, 2006); and
- a desire to see the horizontal and vertical alignment of the road reflect the underlying landform in order to minimise the removal of landscape features (SNH, 2006).

11.4 BASELINE CONDITIONS

11.4.1 Study area

The study area for visual assessment is defined by the extent to which the new road and traffic on it may be visible (see 11.5.2, below). This is shown on the visual envelope maps (VEM) (Figures 11.1a and b).

The study area for the landscape assessment is also based on this VEM but widened out to put the proposed road corridor in context.

11.4.2 Landscape Designations

There are no nationally designated areas of landscape value within the study area.

The coast from Balmedie north to the Ythan Estuary and beyond, the southern part of which can be seen from the study area, are locally designated as an 'Area of Landscape Significance' and as 'Undeveloped Coast' (see Figure 11.2 and Section 5.5) (see Photograph 11).

The existing A90 forms the boundary of the Undeveloped Coast designation from south of the study area north to Rashierieve. The eastern half of the Balmedie Junction would therefore touch on this designation.

The proposed road would not encroach on the Area of Landscape Significance, although that policy also refers to development adjacent to the designation. However, except just south of Balmedie, the proposed road is over a kilometre from the designation boundary.

[147] Environmental Resources Management. South and Central Aberdeenshire: Landscape Character Assessment (SNH Review No 102) 1998

Neither designation prohibits development but both require high standards of design and respect for the character, environment and amenity of the surrounding area.

Menie House and Balmedie House are both in the 'Extended Inventory of Gardens and Designed Landscapes for Gordon District[148]'. Although close to the proposed road, neither is directly affected by it.

11.4.3 Landscape Description

The area between Balmedie and Tipperty is part of the North-East Lowlands, a gently undulating, low-lying plain, dominated by intensive farming and stretching from Aberdeen to the Moray Firth.

The study area is part of a zone where the gently rolling plains of morainic drift and boulder clay that covers much of the north-east of Scotland slope gently down to a broad sandy and dune-rich coastline.

Locally, the area falls gently, from the Menie and Foveran Hills in the west towards the coast in the east. The slopes are slightly steeper and the elevation generally higher in the southern half of the study area, and more particularly around the centre (high points at Aikenshill and Cowhill, 90m and 80m AOD respectively). The northern half of the study area is generally more gently sloping and at a lower elevation (a low point at Tipperty of about 20m AOD).

Associated with this south - north decrease in altitude is a gradual transition from one landform pattern to another. In the south, the landform is fairly undulating, creating a small scale and intimate landscape; whilst to the north the landscape is more open and consists of broad valleys, ridgelines and open rolling hills.

There are no major watercourses within the study area but there are numerous small watercourses or burns, which run west-east towards the coast, of these the most important are the Blairton Burn (south of Orrock House). Sandend Burn (Delfrigs), Foveran Burn (Foveran), and Tarty Burn (Tipperty) (see Section 9.5.1).

Within the overall undulating landscape, these burns have created a general grain of subtle ridges running east-west. Three of these form important skyline elements within the landscape, at Orrock, Rashierieve, and Fountainbleau.

The land use of the area is predominantly agricultural, and the easy gradients, mild climate and fertile soils have resulted in a landscape of intensively managed farmland. Field patterns are an important landscape element. Most field boundaries are of post and wire fencing, particularly in the northern half of the area. There are a few hedgerows and some dry stone dykes in the south, which more strongly define the smaller and more intimate fields of this area.

Overall this is an open landscape with comparatively little woodland, tree or shrub cover. However, groups of mature deciduous trees and mixed shelterbelts

[148] Scottish Development Department. An Inventory of Gardens and Designed Landscape in Scotland Volume 3: Highland, Orkney and Grampian .Countryside Commission for Scotland and Historic Buildings and Monuments Directorate Land Use Consultants 1987

punctuate the landscape and, particularly in the south, there are sheltering copses associated with farm buildings and residential properties.

Tree groups and small woodlands also occur mostly in the south. The most substantial of these are around Balmedie small-holdings, the shelterbelts and policy woodlands at Menie House, and the policy woodlands at Balmedie House. A substantial area of new woodland has been planted to the west of Delfrigs, but this has yet to make much impact on the wider landscape.

In the north, there are substantial areas of young conifers (primarily Christmas tree farming) which because of their small size have little effect on the landscape. The policy woodlands of Foveran House (to the northeast near Newburgh, outwith the study area) form an important element in the wider landscape.

Settlements tend to be scattered and consist predominantly of traditional single and one and a half storey cottages and farmsteads. Settlement tends to be located along the existing A90, in the form of villages at Balmedie, Foveran and Tipperty, and smaller hamlets such as Delfrigs and Rashierieve (see Section 6.4.6).

In terms of visual amenity and views from the road, there are differences resulting from the different landforms in the north and south and the changing proximity of the existing A90 to the coastline. In the south, there are extensive views of the coast and the sand dunes from the existing A90 until one passes the ridgeline at Rashierieve. Beyond this point, there are only few glimpsed views of the coast in a broad and gently rolling, inland agricultural landscape.

11.4.4 Landscape Character Areas

The study area is covered by the South and Central Aberdeenshire: Landscape Character Assessment carried out on behalf of SNH in 1998 (see Section 11.2).

This study, which was carried out at the scale of the old counties and mapped on a 1:250,000 scale base, distinguishes two landscape character areas in the study area: The Formartine Links (a ‘coastal strip’ landscape character type) and the Formartine Lowlands (an ‘agricultural heartlands’ landscape character type).

Formartine Links

‘a landscape of windswept open character predominated by rough grazing and scrubby sand flats. Few shelterbelts or woods interrupt the horizon, an occasional solitary tree or building stands isolated within the expanse’.

Formartine Lowlands

‘Gently undulating lowland plateau. … a rich agricultural resource. Its land comprises open geometric fields of mixed farming divided by post and wire fences or derelict stone dykes. Woodland is scarce and that which occurs, often associated with estate policies, is prominent as a result. The gently eastward falling relief allows long views across some areas and, when including the distant horizon of the North Sea, the landscape provides a tremendous sense of space which distracts from the clutter of near views’

At the scale of the study area, differences within each of these landscape character areas can be perceived, giving a total of four character zones[149], of which three are traversed by the new road (see Figure 11.3).

Formartine Links (Developed / Developing) Landscape Zone
South of Balmedie the road traverses a part of the Formartine links landscape character zone which is substantially influenced by the built-up area of Balmedie.

The underlying landform is rolling and undulating on a very small scale, an almost seamless transition between the drumlin/moraine landscape inland and the dunes along the coast.

Most of the area east of the A90 is rough grassland, with gorse scrub developing on the less used and rougher areas of ground. West of the A90, as this landscape merges into the Formartine Lowlands, is a golf course and improved grassland. The only significant trees in the area are those associated with houses and the existing A90, of which the most significant are the trees at the southern entrance to Balmedie.

Outwith Balmedie, settlement is very scattered, with a small group of houses at South Foveran The area immediately south of Balmedie is zoned for development in the local plan, and house building is already underway in parts of the area.

The landform, lack of tree cover, and the presence of the coast alongside combine to give long and open views and generally create a very open, even exposed, and large scale landscape character.

The quality[150] of the landscape in the Formartine Links landscape character area varies from 'ordinary' to the poor side of 'ordinary' at the bare edges of the new development south of Balmedie, to 'good' verging on 'very attractive' in a wild and exposed manner along the coast.

Figure 11.4 illustrates this area.

Formartine Lowlands – Southern, Rolling Landscape Zone
The southern half of the Formartine Lowlands landscape character area, south of the ridgeline at Rashierieve, is a rolling and generally well tended agricultural landscape, small scale and enclosed.

Within the overall undulating landscape, there is a general grain of subtle ridges running east-west. The ridge at Orrock forms an important element in views from the south, with its distinctive drumlin-like knoll and Orrock House looking down from its small clump of sheltering woodland (see Photograph 7, Annex D).

[149] The following paragraphs describe the character zones traversed by the new road. The fourth zone – Formartine Links – has limited visibility of the new road such that there are unlikely to be any indirect effects on its landscape character

[150] The Design Manual for Roads and Bridges (Volume 11, Section 3, Part 5.3) requires an assessment of the quality of the landscape and suggests a five-point scale (highest quality, very attractive, good, ordinary and poor landscapes). This is of necessity a subjective exercise but by considering this scale across the whole of Scotland's landscapes (e.g., highest quality in some of the most scenic parts of the northwest coast, poorest quality in areas of industrial dereliction in the Central Belt) it is possible to classify the landscape quality of the study area as given above

The predominant land use is intensive mixed agriculture, with some small areas of marsh and moor. Woodland cover is denser than in the north, with clumps of sheltering trees around most houses, the mature policy woodlands at Menie House, and an extensive area of new woodland planting around Dambrae and north to the east of Delfrigs (see Photograph 12).

Settlement consists of generally isolated, traditional farmsteads and associated single and one and a half storey stone cottages, with a small concentration of cottages up the shallow valley above Menie West Lodge.

Stone dykes and associated hedgerow planting form many of the field boundaries, although post and wire fencing predominates. Field patterns, which reflect the nature of the underlying topography, are smaller and less geometric than in the north. This field pattern, combined with the shorter views in this more rolling topography, creates a smaller scale and a degree of intimacy in the landscape. In the centre of the area, away from the existing A90, and where there are fewer views of the sea, there is equally a degree of calm and tranquillity.

This half of the Formartine Lowlands, with its more intimate, wooded, less intensively agricultural land use, smaller field patterns and cultural and historical associations, is generally of higher landscape quality than the northern half. It varies from 'ordinary' to 'good' with pockets of 'very attractive' such as around the Belhelvie ruined church.

Figure 11.5 illustrates this area.

Formartine Lowlands – Northern, Open Landscape Zone

From the gentle sweep down of the ridge at Aikenshill, north past Tipperty, the northern half of the Formartine Lowlands is a landscape of very broad shallow valleys and subtle ridgelines under predominantly intensive arable agriculture with extensive areas of Christmas tree plantation in the north. Fields are large, lightly contained by post and wire fences, and views are long and extensive. Although there are a few glimpsed views of the coast, the sense of proximity to the sea present further south is lost, and the main characteristic of the area is one of inland intensive farming.

The pattern of settlement and associated vegetation remains scattered, but there are fewer stands of dense vegetation and farmsteads and cottages appear generally more scattered. There are areas of more modern housing at Tipperty and Foveran, some of which are incongruous against the traditional farm houses and cottages characteristic of the area.

Outwith the settlements, it is a very open and large scale landscape, bleak and exposed in poor weather. In qualitative terms it is generally very much of an 'ordinary' landscape quality, and on the poor side of ordinary in the young conifer plantations between Fornety and Fountainbleau.

Figure 11.6 illustrates this area.

11.4.5 Landscape Quality

11.4.6 Potential for Landscape Change

The main force for landscape change identified in the South and Central Aberdeenshire Landscape Character Assessment is the pressure for new housing, both in terms of scattered development in the countryside and in the expansion of existing settlements.

The former is apparent in the number of recent steading conversions in the study area. The latter is apparent in the one aspect of the existing landscape that is anticipated to change in the foreseeable future without the implementation of the proposed A90:

- the Formartine Links area south of Balmedie is zoned for development in the local plan and is likely to develop into a suburban area within the next five to ten years.

There are also two areas where the existing landscape may change if planning permission for live proposals is granted (see also Section 5.6):

- a quarry which is proposed just northwest of Balmedie. If approved, this would substantially change the character of the affected part of the southern, rolling zone of the Formartine Lowlands;

- a major golf course and related development which is proposed in the Menie Estate. If approved, this and its connecting roads are likely to alter the character of the affected part of the southern, rolling zone of the Formartine Lowlands and the adjacent Formartine Links zone.

11.5 METHODOLOGY

11.5.1 Introduction

This chapter has been prepared with reference to Volume 11 of the Design Manual for Roads and Bridges (DMRB), supplementary guidance published by the Scottish Executive in February 2002[151], and to the Guidelines for Landscape and Visual Impact Assessment published by the Landscape Institute and IEMA (2nd edition, 2002).

It assesses two distinct but closely related areas of impacts: landscape and visual.

11.5.1.1 Landscape

The character of the landscape derives from a combination of physical factors, natural processes and human intervention.

The landscape assessment considers the changes to the character of the landscape likely to result from the proposed scheme. It synthesises the effect of the scheme on the landscape as a whole, effects on significant individual

[151] Supplementary Guidance to DMRB Vol 11 S.3 Pt. 5 Landscape & Visual Assessment, issued by the Scottish Executive Development Department, National Roads Directorate, 11th February 2002

elements of the landscape, and effects on characteristic combinations or patterns of elements.

Landscape character is generally considered to be a resource in its own right, which exists whether or not there are people present to view it.

11.5.1.2 Visual

Visual impact assessment is concerned with the views that are available to people affected by the proposed road, and their perception and responses to changes in these views.

Visual impacts can arise from new elements in the landscape that viewers may find intrusive, from new features that obstruct views, or from the removal of existing elements in the view. The assessment considers the response of the people who experience these effects, and it considers the overall consequence of these effects on the visual amenity - the pleasantness, or otherwise, of the view or outlook – that they enjoy.

For the purposes of assessment, whilst it is the people living, working and recreating in the area who actually receive the views and enjoy the visual amenity, it is the places they may occupy that are mapped and described as the 'receptors' of the views.

Where mitigation proposals include planting, this would take time to develop. The impact is therefore assessed both for a notional winter day in the year of opening, when the planting would have little effect, and for a summer day fifteen years later when vegetation growth would have made a difference to the degree of visual impact experienced.

11.5.2 Limits to Visibility

The area of study for visual impact assessment is the area from which the proposed road, including side-roads, or the traffic on them may be seen (by definition, visual effects can only occur where at least some part of the development is visible). The first step in the assessment is therefore to establish this area, the 'visual envelope'.

The visual envelope was produced by computer modelling. A three dimensional model of the road was overlain on to the Ordnance Survey's 10m digital terrain model (DTM). A notional line 4m above the road centreline was generated to allow for the height of typical lorry, and computer generated 'lines of sight' from points at very regular intervals along the road were produced. Some items that might block the view were factored in: areas of mature woodland were modelled at a standard height of 10m and built-up areas at a standard height of 8m. Smaller screening factors such as individual or small groups of trees were ignored.

Distance is important in considering visibility because the apparent size of any object diminishes with distance. It is generally considered that in flat terrain the visual impact of a new trunk road and the traffic on it is unlikely to be significant beyond a kilometre[152]. This was checked for the study area during an early site

[152] DMRB Volume 11 Section 3 Part 5 Annexe III para 7

visit and found to hold true: the 'lines of sight' described above were therefore restricted to a maximum of 1km long.

The visual envelope therefore gives a 'worst-case' scenario: the area up to one kilometre from the road from which a 4m high vehicle on it, or on the side roads and bridges, may be seen, without considering local screening that might block the views.

The end result is the Visual Envelope Map (VEM, see Figures 11.1a and 11.1b).

11.5.3 Significance

Both for the landscape and visual assessments significance of the various effects of the proposed road derives from the combination of the **magnitude** of change and the **sensitivity** of the site or of those human receptors who benefit from a given view.

11.5.3.1 Landscape

The **magnitude** of change to the landscape can be categorised as follows:

- **High**: a noticeable change to the landscape over a wide area or an intensive change over a limited area.
- **Medium**: small changes to the landscape over a wide area or noticeable change over a limited area.
- **Low**: very minor changes to the landscape over a wide area or minor changes over a limited area.

The sensitivity to change of a landscape varies with the type of change being considered and how it affects the landscape. Sensitivity is a function of how much the landscape is able to accommodate the changes caused by the new road and the value ascribed to the landscape by the public and by public authorities.

Landscape **sensitivity** can be broadly categorised as:

- **Highly sensitive**: areas of landscape that are highly valued, particularly rare or distinctive, or considered susceptible to small changes.
- **Moderately sensitive**: areas of landscape that are valued more locally and/or are tolerant of moderate levels of change.
- **Slightly sensitive**: areas of landscape that are generally more commonplace, considered potentially tolerant of noticeable change, or undergoing substantial development such that their character is one of change.

There is no precise link between landscape sensitivity and landscape quality but in general, areas that are considered of higher quality tend to be more highly valued.

11.5.3.2 Visual

The **magnitude** of change is a function of the scale and type change to the landscape in the view under consideration. This includes the distance to the changed parts of the view, the type of change to the landscape (whether the changes are well integrated or stand out in contract or above the horizon) and the extent of the view affected by the change.

Magnitude can be broadly categorised as follows:

- **High**: the proposed development dominates the view and substantially changes its character and quality. Examples of this might be
    - a road junction in full view, or
    - a high embankment cutting across a currently open view
- **Medium**: the proposed development is clearly noticeable in the view and affects its character or quality. Examples of this might be
    - the new road extensively visible in the middle-ground of a rural view
    - lighting from a partially screened junction in a rural landscape where there was previously no road lighting
- **Low**: the proposed development does not affect the character and quality of the view, or it is a minor element likely to be overlooked by the casual observer. Examples of this might be
    - the new road visible in the background of a wide view
    - a new cutting is visible but does not form an obviously intrusive notch in the skyline
    - temporary loss of vegetation which is only partially visible

The **sensitivity** of the receptors of visual effects is a function of their expectations and reasons for being there, the importance and value of the landscape viewed, and the nature and context of the viewpoint and the importance of the view.

Visual **sensitivity** can be broadly categorised as follows:

- **Highly sensitive**: receptors for whom or from which the view is important and where changes would be particularly noticed. For example
    - residential properties where the road is seen in the main outlook
    - regularly used or locally valued public open spaces or outdoor recreation sites
    - well used or locally valued footpaths or public viewpoints.
- **Moderately sensitive**: receptors for whom or from which the change in the view is a small element in the overall view, not critical to the visual amenity, or where the nature of the view is of secondary importance to the user. For example
    - residential properties where the road is seen from a side window
    - hotels and restaurants
    - lightly used public open spaces or outdoor recreation sites
    - lightly used footpaths or public viewpoints
    - people travelling on roads and railways
- **Slightly sensitive**: receptors for whom or from which the change is unimportant or irrelevant, or where their attention can reasonably be expected to be focussed on their work or activity, for example
    - workplaces
    - indoor recreation centres.

11.5.3.3 Significance Categories

The significance of the visual and landscape impacts has been categorised as set out below, on the basis of the professional judgement of skilled observers,

working in the field. It must be emphasised, however, that there is a continuum of impacts and that the steps in the categories are guideline thresholds. Assessments of magnitude and sensitivity, as well as the choice of the significance category into which a given effect should be placed, are all matters of professional judgement.

Table 11.1: Guideline Landscape Impact Significance Categories

Significance	Definition	Guideline Thresholds
None	No detectable change to the environment	No discernible change to the landscape
Minor	A detectable but non-material change to the environment	Minor changes to a landscape considered tolerant of change
Moderate	A material but non-fundamental change to the environment	Noticeable change to a landscape tolerant of moderate levels of change
Major	A fundamental change to the environment	Noticeable change to a sensitive or nationally valued landscape, or intensive change to less sensitive or regionally valued landscape

Table 11.2: Guideline Visual Impact Significance Categories

Significance	Definition	Guideline Examples
None	No detectable change to the environment	Neither the road and its structures nor traffic on it can normally be perceived.
Minor	A detectable but non-material change to the environment	The changes caused by the development are a minor element in a view and/or the view is of minor importance to the viewer
Moderate	A material but non-fundamental change to the environment	The changes caused by the development are clearly noticeable and affect the quality of a view and/or the view is incidental or of secondary importance to the viewer
Major	A fundamental change to the environment	The changes caused by the development dominate and substantially alter the character of the view, and/or the view is considered important to the viewer

11.5.3.4 Assumptions and Technical Deficiencies

For the landscape assessment, the significance assessed is that of the impact of the proposed road on the landscape character zone as a whole. This can tend to under-record the significance perceived within a localised area. For example an embankment across a small valley may have a major adverse impact on the landscape of that valley, whilst the road as a whole may result in only a moderate effect on the landscape character zone as a whole.

For the visual assessment, all places from which it was considered there could be a significant impact were considered. However, in order to keep this assessment comprehensible, groups of receptors with similar impacts, particularly groups of houses with similar views, have been treated as one receptor.

The expected changes to views from buildings were assessed from outside the buildings in question. The views assessed are therefore not exactly those which are experienced by the receptor, although every effort was made to envisage what the view would be.

The Visual Envelope Map (VEM) was used as a working tool for the purposes of selecting the receptors to be assessed and as so it was deliberately designed to err on the side of caution. There may be receptors outwith the VEM which have not been assessed but if there are, it is unlikely that they would be subject to any significant impacts.

The views of the professional carrying out the assessment may not necessarily be those of other professionals or of people using the area; however the nature of the assessment has been made as objective as possible in order to reduce inconsistencies and anomalies.

The assessment is based upon the views of the professional carrying out the field survey work and is consistent over the study area.

11.6 POTENTIAL IMPACTS

11.6.1 Introduction

The proposals are described in full in Chapter 3. This section highlights the aspects of the development that may have landscape or visual impacts.

11.6.2 Potential Landscape Impacts

The new road may affect the landscape in a number of ways, including:

11.6.2.1 Permanent Impacts

- Introducing a large linear feature, with associated structures, into a rural area;
- direct loss of landscape features such as trees, woodlands and knolls;
- altering an individual landform with a cutting or an embankment;
- altering the pattern of the landscape by introducing a strong line that cuts across a linear 'grain' to the landscape;
- altering the pattern of field boundaries;
- altering features of natural or cultural heritage interest.

11.6.2.2 Construction Impacts

There may be localised landscape impacts from the presence of construction compounds and temporary spoil heaps. Overall however, the impacts on the landscape during the construction period would be the same as the permanent impacts, although generally of slightly greater significance immediately after construction, before the raw scars of new cuttings and embankments have had a chance to 'green up' from the landscape works. Changes to the landscape are also likely to be more noticed by local residents or regular passers-by during the construction period because of the short time-scale over which they take place. On the other hand, construction impacts may be considered to be less significant due to their temporary, short term nature.

11.6.2.3 Operational Impacts

- Introducing the movement and noise of vehicles into a tranquil landscape;
- the introduction of vehicle lights at night into previously dark areas.

11.6.3 Potential Visual Impacts

The likely visual effects of building the new road include:

11.6.3.1 Permanent Impacts

- The intrusion of the road into comparatively undisturbed areas of higher quality landscape, such as between Hill of Menie and Stoneyards;
- new embankments which intrude into people's views, such as at Kirkhill;
- cuttings which create notches on the skyline or scars on the hillside, such as at Orrock;
- structures that stand out in the generally open landscape, such as Variable Message System signs;
- the increased visual presence of the new dual carriageway in addition to the existing road, such that roads form a larger part of the view ; and
- felling of trees that leads to the opening of new views.

11.6.3.2 Construction Impacts

- The installation of a large construction compound;
- the movement and activity of large construction machinery, usually with flashing hazard lights;
- views of cranes;
- new embankments and cuttings, particularly noticeable because of changes over a short time-scale, and the extent of bare earth visible;
- temporary spoil heaps and potentially borrow pits and disposal areas;
- temporary traffic management; and
- floodlighting of areas for evening and morning working during the winter.

11.6.3.3 Operational Impacts

- The introduction of movement (of traffic) into comparatively quiet and restful areas of landscape, such as at Aikenshill; and
- new road lighting changing the night-time view.

11.7 MITIGATION

11.7.1 Introduction

This section starts with a summary of the issues brought out by the original Stage 2 assessment which was carried out in 1995 (see Sections 1.4 and 2.4). It then describes how this was then carried through into the Stage 2a report of 2006, outlines the design strategy which flowed out of this (described section by section of the proposals) and finally sets out the general and specific mitigation commitments arising from this assessment.

11.7.2 Stage Two Assessment (1995)

The original Stage 2 environmental assessment undertook a preliminary landscape assessment of the route alignments then under consideration, and identified a number of issues which would require further consideration during the development of the design at Stage Three, viz:

- minimise the adverse effects of the proposed scheme upon the open agricultural landscape as a whole;
- minimise the effects of the proposed scheme upon the identified landscape character areas;
- reduce, as far as practicable, the loss of existing woodland and hedgerow planting;

- minimise the losses of stone dykes, particularly in the south;
- minimise any adverse effects upon the character and quality of the landscape in the area associated with Orrock House, in order to protect the setting of the listed building;
- reduce as far as practicable the potential adverse effects of sections of steep cutting or embankment within the open landscape, through the grading back of slopes to those which would reflect the existing topography and which would allow for the return of land to agricultural use; and
- minimise potential landscape and visual effects upon the surrounding landscape and properties through detailed horizontal and vertical alignment and the implementation of sensitive earthworks and planting.

11.7.3 Stage 2 Addendum Report (2006)

The Stage 2 Addendum report identified a new preferred alignment, but the general principles of the 1995 assessment remain valid and underpinned the route selection and design process.

Consideration of mitigation was an integral part of the design strategy developed during the Stage 2 Addendum report process, and the selection of the final route alignment was strongly influenced by the aim of minimising the impact of the new road on people and the places they live.

11.7.4 Design Strategy

Once the final route was selected, detailed adjustments to line and level were made to improve its detailed 'fit' to the landform. An example of this is at Orrock House where the line has been designed to pass through the prominent ridge at the point where there is an existing minor valley.

The road landscape design and mitigation strategy which flows out of this ES, and which forms part of the environmental commitments, is designed to reduce and heal the inevitable scars caused to the landscape by the construction of the new road, and to create where appropriate new landscape features to help integrate the road into the landscape.

The visual mitigation strategy includes where possible and appropriate the creation of landform and planted screening to reduce the visibility of the road and of traffic from sensitive visual receptors.

The experience of the road user was taken into account during the development of the landscape mitigation strategy, particularly consideration of views from the road and the potential visual monotony of long sections of cutting. In particular, this resulted in the land on the east side of the road north of the ridge at Aikenshill being left unplanted so that road users would experience the wide views across the broad valley of the Foveran Burn and on towards the Ythan Estuary.

Where a potential conflict between the road user experience and the mitigation of visual or other impacts on existing residents or receptors is identified, the mitigation would take precedence. An example of this is at the crossing of the valley at Dambrae where false cuttings and noise barriers to reduce impacts on Stoneyards and Dambrae would result in a less interesting view from the road.

A fundamental aim of the design throughout has been to sit the road as low as reasonably practical and to generally follow the lie of the land, and for the junctions on this high-load route to be designed as under-bridges, in order to minimise the blocking of views and to reduce the possibility of the road or its structures being apparent as an intrusive object in views of and through the landscape.

The following paragraphs set out the overall design strategy and the general principles of landscape mitigation adopted in the road design, section by section.

Balmedie Junction (Formartine Links Developed / Developing Zone)
West of the existing A90, the design strategy would consist of reshaping and regrading the cutting and embankment slopes to help integrate the shape of the new landform into the existing.

East of the existing A90, it would consist of designing the new road-sides to create a semi-formal entrance to Balmedie with the aim of making positive contribution to the planned urban expansion.

B977 Realignment (Formartine Lowlands – Southern Rolling Zone)
The strategy for the realigned B977 would consist of designing the new road to follow the lie of the land as closely as possible in the southern section to approximately ch0700, then to follow the pattern of the landscape created by the regular field patterns north of about ch0800.

Roadside boundary walls would reflect the local landscape character, and replace those lost to the new road. In places they would also be slightly raised or reinforced to act as noise barriers.

Chainage 0000 to 4000 (Formartine Lowlands – Southern Rolling Zone)
Along this section of road, embankments would be generally be graded out and returned to agriculture, in order to minimise the apparent width of the road corridor and reduce the extent of new landform out of character with the existing landscape. The main exceptions to this would be where the retention of small embankments was preferred in order to give the opportunity to plant screening, and where land falls away from the road such that grading out would be impractical.

Roadside boundary walls would reflect the local landscape character between about ch 0700 and 1900, and replace those lost to the new road. They could also be slightly raised or reinforced to act as noise barriers.

The open landscape setting of Orrock House would be respected by minimising the degree of visual intrusion in the direct prospect from the house (view SSE from the house, looking at ≈ ch1100 to 1500), including sitting the road as close to existing levels as possible. For the same reason, where the road passes through the ridgeline alongside Orrock House (≈ ch1500 – 1700), additional land take would allow the creation of a naturalistic landform.

New planting would be designed as clumps and groups, to avoid visually reinforcing the linear nature of the new road.

The opportunity would be taken to create a more significant block of woodland on the line of the abandoned old road at ≈ ch0500, for reasons of compensatory landscape and habitat improvement.

Where the road passes through areas of new amenity and plantation woodland between the Menie Burn and the Sandend Burn (≈ ch2400 to 3400), more extensive roadside planting would be carried out to help integrate into the developing woodland.

Where the road passes houses from Hill of Menie to Stoneyards (≈ ch2200 to 3100) noise barriers are required which have potential landscape and visual impacts. The design strategy would therefore require a balance to be struck between the mitigation of noise impacts (Section 14.7) and the mitigation of landscape and visual impacts.

Landform would be designed to provide noise barriers where the road passes Aikenshill and the adjacent cottages (≈ ch3500 to 4000), tapering out to allow clear views northeast to drivers as they crest the ridge northbound at about ch4000.

Chainage 4000 to 9000 (Formartine Lowlands – Northern Open Zone)
As with ch0000 to 4000, embankments would be graded out and the side slopes returned agriculture, except where other design consideration take precedence or the landform is such that grading out would be impractical.

Roadside boundaries would consist of a simple fence in keeping with the open agricultural nature of the landscape.

The junctions with the A975 and with the B9000 would be designed so that the new road passes over the side roads, at or only slightly above the existing ground levels, so as not to create an intrusive landform (see Photograph 17).

Noises barriers would be required where the road passes houses at Kirkhill (≈ ch4200 to 4400). As at Boghead to Stoneyards, a balance would have to be struck between the noise mitigation and the landscape and visual impacts of the noise barrier. The embankment required at Kirkhill would be kept as low as reasonably practical to minimise intrusion into the landscape.

The opportunity would be taken to create a blocks of woodland around the two road junctions, to help reduce the visibility of traffic from the wider landscape as well as for reasons of compensatory landscape and habitat improvement. New planting associated with the road would be designed as clumps and groups, to avoid visually reinforcing the linear nature of the new road.

11.7.5 General Mitigation

The landscape mitigation is shown in plan form on Figures 11.7a-h.

The mitigation commitments in this section apply generally to the entire scheme.

LV1. Junctions would be designed with the main road passing over the side road to minimise the creation of upstanding landforms in this generally open landscape.

LV2. Wherever practical (taking into account constraints of land-take, planting requirements, etc) embankments and shallow cuttings would be graded out

to slopes of 10% or less and returned to agriculture, to minimise the apparent width of the road and thus reduce the landscape impact as well as reducing the overall land lost to agriculture. The locations where this is a specific mitigation commitment are shown on Figures 11.7a-h.

LV3. Cutting and embankment slopes would be rounded off both top and bottom to the largest radius practical and generally shaped to create as naturalistic landform as possible within the constraints of the land made available.

LV4. Bunds and false cuttings would be tapered out at a gradient of not more than 14% along the road line in order to avoid sharp and un-natural transitions between landforms.

LV5. All planting and wildflower seeding would be carried out using plant material of local provenance (the closest provenance that is available in commercial quantities) in order to ensure maximum benefit for local biodiversity.

LV6. All areas of grass within the road corridor not subject to routine mowing (i.e. beyond verges) or returned to agriculture would be sown with a locally appropriate grass/wildflower mix to provide seasonal visual interest and to increase local biodiversity. (except where these would be so narrow as to create practical difficulties during construction or maintenance).

LV7. New woodland planting would consist primarily of locally native species, for functional, visual and biodiversity reasons. Small numbers of non-invasive non-native evergreens may be introduced at the detailed design stage to reinforce the screening value of woodland near houses. Species used would be selected from the following:

Table 11.3: Species used in New Woodland Mitigation Planting

Shrubs	
Elder	*Sambucus nigra*
Goat Willow	*Salix caprea*
Grey Willow	*Salix cinerea*
Hawthorn	*Crataegus monogyna*
Hazel	*Corylus avellana*
Privet	*Ligustrum vulgare*
Osier	*Salix viminalis*
Dog-rose agg.	*Rosa canina* agg.
Raspberry	*Rubus idaeus*
Blackthorn	*Prunus spinosa*
Bramble	*Rubus fruticosus* agg.
Honeysuckle	*Lonicera periclymenum*
Trees	
Alder	*Alnus glutinosa*
Ash	*Fraxinus excelsior*
Beech	*Fagus sylvatica (locally common, not native)*
Downy Birch	*Betula pubescens*
Silver Birch	*Betula pendula*
Bird Cherry	*Prunus padus*
Wild Cherry	*Prunus avium*
Wych Elm	*Ulmus glabra*
Holly	*Ilex aquifolium*
Pedunculate Oak	*Quercus robur*
Sessile Oak	*Quercus petraea*

Scots pine	*Pinus sylvestris*
Rowan	*Sorbus aucuparia*
Non-native evergreens or semi-evergreens for screening purposes	
Portuguese laurel	*Prunus lusitanica*

LV8. New hedges would consist primarily of locally native or locally common species, for functional, visual and biodiversity reasons. Species used would be selected from the following:

Table 11.4: Species Used in New Hedge Mitigation Planting

Hedge Species	
Beech	*Fagus sylvatica* (locally common, not native)
Hawthorn	*Crataegus monogyna*
Blackthorn	*Prunus spinosa*
Holly	*Ilex aquifolium*
Honeysuckle	*Lonicera periclymenum*
Roses	Rosa spp (native species typical of the area)

LV9. SUDS areas would be planted up with appropriate wetland and marginal species for functional, visual and biodiversity reasons. Areas likely to be regularly wetted or to have damp soils would be seeded with a wetland wildflower and grass mix. Approximately 20% of any shallow permanently wet areas and 30% of damp pond margins would be planted with clumps of locally native species selected from the following:

Table 11.5: Species Used in Permanently Wet Areas and Pond Margins

Permanently wet and margins	
Common Reed	*Phragmites australis*
Reed Canary-grass	*Phalaris arundinacea*
Reed sweet-grass	*Glyceria maxima*
Common spike-rush	*Eleocharis palustris*
Floating sweet-grass	*Glyceria fluitans*
Margins only	
Meadowsweet	*Filipendula ulmaria*
Creeping Jenny	*Lysimachia nummularia*
Yellow flag	*Iris pseudacorus*
Marsh marigold	*Caltha palustris*
Brooklime	*Veronica beccabunga*

LV10. Stone would be retained from demolished field boundary walls to be re-used in the construction of new field boundary walls where specified below. As far as practical lichen / moss covered sides of the stone would be used on the outside of the new walls.

LV11. Engineering structures would be faced with materials or with patterns sympathetic to the rural environment. This would include avoiding the use of plain facing to wing-walls, unsympathetic geometric patterns such as hexagonal reinforced earth panels and gabions.

11.7.6 Mitigation during Construction

The mitigation commitments in this section apply generally to the entire scheme.

LV12. Construction compounds would be located away from residential areas as far as practical.
LV13. Lighting of compounds and construction areas would be restricted to the minimum necessary for safe working and site security.
LV14. Materials and machinery would be stored tidily during the works. Tall machinery including cranes would not be left in place for longer than required for construction purposes, in order to minimise its impact in views.
LV15. Roads providing access to site compounds and works areas would be maintained free of dust and mud.
LV16. On completion of construction, all remaining construction materials would be removed from the site.

11.7.7 Specific Mitigation

The sections following contain more specific local mitigation commitments, but the general commitments above (such as the wildflower seeding, or the rounding off of earthworks) are not repeated. These commitments are shown in plan form in Figures 11.7a-h and in cross section in 11.8a-f.

Side Roads South of Balmedie

LV17. A small copse would be planted between the Easter Hatton link and the existing A90 opposite Wester Hatton to help reduce visibility of traffic on the side road and a roadside hedge would be planted between the A90 and the side road in order to reduce the risk of headlight intervisibility between the two roads.
LV18. A copse of mixed native woodland would be planted on the northwest side of the SUDS pond adjacent to Easter Hatton, extended into the pond as an area of mixed willow scrub. Smaller copses of mixed willow scrub would be planted on the SW and NE corners of the SUDS pond. All to help integrate the SUDS feature into the landscape and provide habitat benefits.
LV19. The Millden link road across the golf course would be finished in a neat manner appropriate to the style of the golf course. A detailed design study would be carried out in consultation with the affected landowner. The roadsides may be hedged, planted as an avenue, or simply left unfenced.
LV20. The access to the houses at South Folds would be designed to reinstate suitable garden boundaries where these are affected. A detailed design study of the area would be carried out in consultation with the affected householders.

Balmedie South Junction

LV21. Woodland would be planted to replace the existing roadside vegetation south of Balmedie Junction removed where the cutting is widened.
LV22. The intersection of cut slopes at the B977 junction would be shaped to create a naturalistic landform.
LV23. Woodland would be planted on and above the large cutting slopes and between the road and the burn, to provide a new feature to help integrate the road into the landscape and to improve screening of the new junction from The Holdings. The woodland would be an alder/willow dominated wet woodland within about 10m of the burn (dependent on soil conditions).
LV24. Woodland would be planted on the embankment and across the scheme

corridor between South Folds and the junction to help screen the new junction from the adjacent houses.

LV25. At the detailed design stage, the possibility of de-culverting the Millden Burn would be considered and implemented if practical. The de-culverting would create a new naturalistic stream course (with pools if possible) to provide visual interest and wildlife habitat value.

LV26. Entrance to Balmedie (Old Road) - slopes would be slackened on the outside of the bend to give a more natural landform, but kept steep on the inside of the bend where necessary to minimise loss of semi-mature conifer woodland. An alignment of trees would be planted on the outside of the bend to provide a semi-formal entrance to the village. These would be a decorative or formal species, possibly *Prunus padus* (bird cherry) or a non-native such as *Malus tschonoskii* (crab apple) or a *Tilia* (lime) variety, to be decided at detailed design stage in consultation with the local authority. Mixed woodland would be planted on the cut slope on the inside of the bend to reduce the impact of the cut into the existing woodland. Existing mixed woodland planting either side of Old Road would be extended southwards.

LV27. Entrance to Balmedie (eastwards), a beech hedge would be planted either side of the road as shown on Figure 11.7a to provide a semi-formal but subsidiary entrance to the village.

LV28. Woodland would be planted on the outside of the southbound slip and around the SUDS pond to provide partial screening of road for planned housing development south of village.

LV29. Works would be carried out to the garden at No 6 The Holdings to compensate for the loss of garden to the junction slip road. The extent and detail of these works would be the subject of a detailed design study in consultation with the affected householder. The road cutting would be formed as a retaining wall to minimise the loss of garden ground, and continued up to form a new garden wall with some noise reducing value. This wall may be extended across the closed-off junction to The Holdings.

B977 Link Road

LV30. The field boundaries of the B977 link would be new mixed hedges (except as noted below) with standard oak or ash trees (average 1 per 20m, but in irregular groups) to help to help integrate the new road into the local landscape.

LV31. From 0220N to 0535N and along the north side of the local access to The Holdings, the field boundary would be a mortared wall in the style of local drystane dykes.

Balmedie Area (approx ch0000 to 0700)

LV32. Ch0140N to 0550N, new mixed hedge along road boundary to help integrate new road into local landscape.

LV33. Ch0200S to 0300S, old road grubbed up[153] and returned to agriculture (integrated into adjacent field).

LV34. Ch0300S to 0700S, old road grubbed up and area of road and triangle of old field planted as a large block of mixed native, primarily deciduous woodland to create a compensatory landscape feature and habitat, also to

[153] All areas of old road would be grubbed up unless the landowner requested it to be left (see Section 6.6.4)

screen the new road from users of the old road and from The Bungalow. Linear glades would be left through this woodland to accommodate existing services retained on their original alignment.

LV35. Ch0300N to 0520N, clumps of woodland planting to reduce the visual impact of the noise bund and barrier when seen from the Drumhead area.

South Orrock to Orrock Overbridge (approx ch0700 to 1900)

LV36. Ch0680N to 1900N, road boundary as a mortared stone wall in the style of the local drystane dykes, raised to 1.5m high north of ch1300 to also act as a noise barrier.

LV37. Ch0930N to 1100N, several clumps of mixed woodland on the road embankments to filter views of the road from South Orrock without creating a solid barrier.

LV38. Ch1500 to 1750 (both sides) the cutting through the ridge by Orrock House would be very well rounded off and shaped to appear natural in order to help reduce the landscape impact of the new road on the setting of Orrock House. On the east side the cutting slope would be returned to agriculture, partly to avoid a fence line cutting across the summit of the knoll. On the west side a copse of woodland would be planted to help reinforce the separation between the house and the road.

LV39. Ch 1750N, a small woodland copse would be planted between the diverted house access and the new road to give a stronger visual logic to the road realignment and to help reinforce the separation between Mains of Orrock and the new road.

Orrock Overbridge to Sandend Burn (approx ch1900 to 3400)

LV40. Orrock overbridge, north west side and main line ch1920N to 2600N, new mixed hedge along road boundary to help integrate new road into local landscape, also to screen noise barrier where necessary.

LV41. Ch2350S to 2450S, a copse of woodland would be planted immediately alongside the road, to help screen the new road from Hill of Menie Croft.

LV42. Ch2600 to 2710 both sides, copses of mixed woodland to help screen the new road from Seven Acres and Wardhead, to help integrate the road into the landscape, and also to provide a compensatory landscape feature and habitat for the scrub woodland lost adjacent.

LV43. Ch2580 both sides to 2850S and to 2950N false bunds for noise and visual screening of road, to have gently undulating long profile and irregular slopes to give a more natural appearance when viewed from the old A90.

LV44. Ch2720 to 2980 both sides, scrub / shrub mix planted on false cutting to help screen the new road from Stoneyards and Dambrae, also to screen noise barrier where necessary, whilst retaining some views east from Stoneyards.

LV45. Ch2980 to 3390 both sides, mixed woodland planting to help integrate the road into the landscape, and also to provide a compensatory landscape feature and habitat for the plantation woodland lost to the road.

Sandend Burn to Aikenshill (approx ch3400 to 4000)

LV46. Ch3400S to 4000S, landform to create a noise barrier of naturalistic appearance between the road and the houses along the track to Aikenshill,

returned to agriculture as far as possible.

Aikenshill to Foveran (approx ch4000 to 6100)

LV47. Ch4130N to 4460N, the embankment would be extended into a false cutting at least 1.5m higher than the adjacent carriageway edge to provide immediate screening of cars on the road from Blair Lodge. The western face of the bund would be flattened out and substantially rounded to present a naturalistic face to the outside.

LV48. At about ch4100 and ch4500 the level of the new road centreline would be no more than 600mm above the existing ground levels, so that the embankment past Blair Lodge is tapered and controlled in height.

LV49. Ch4130N to 4460N, mixed woodland would be planted on the outside face of the bund to 4370N, and scrub / shrub mix on the outside face north of 4370N, to help integrate new road and landform into local landscape and to screen noise barrier where necessary, whilst allowing some views east and south-east from Blair Lodge.

LV50. Ch4840 or thereby, the level of the new A90 where it crosses the realigned A975 would be no more than 3.5m above existing ground level so as to avoid the creation of an intrusive landform in this open, gently sloping landscape.

LV51. Ch4600 to the realigned A975, the islands of land in the junction and the side road slips would be planted with mixed native woodland, covering at least 70% of the available area, and including glades within the larger island, to create an attractive new landscape feature to help integrate the junction into the wider landscape whilst also providing landscape and biodiversity / habitat benefits.

LV52. Ch5200N to 5320N, between the new A90 and the realigned old road, the land would be mounded to no more than 1.5m above existing levels and a mixed native woodland copse would be planted, to screen the old road from the new (particularly headlights) and to reinforce visually the realignment of the old road for road safety purposes.

LV53. Ch5320N to 6010N, the area of land between the new and the old would be subject to subtle land-raise to improve the separation of the old and new roads and screening from the roadside houses. The extent of the land-raise would be subject to the availability of fill with priority given to improving screening for the roadside houses. This would involve the raising of the land by no more than 2m maximum, graded out gently (slopes under 10%) as a naturalistic gently rolling landform varying in height along the line of the road and returned to agriculture on completion.

LV54. A copse of mixed native woodland would be planted on the northwest side of the SUDS pond between ch5980 and 6040, extended into the pond as an area of mixed willow scrub. Smaller copses of mixed willow scrub would be planted on the SW and NE corners of the SUDS pond. All to help integrate the SUDS feature into the landscape and provide habitat benefits.

Foveran to Tipperty (approx ch6100 to 9000)

LV55. Ch6120 to Foveran overbridge both sides, the line of the old road and the remnant fields either side would be planted up to help screen the new road and side roads from Foveran School and from Mill of Foveran.

LV56. Ch6340N to 6400N, cutting would be planted with mixed native woodland

to blend in with the new woodland planted in the field to the west.

LV57. Ch6850 to 7000 both sides, and Pitmillan overbridge side road within 30m of the main line cutting, side slopes planted up with mixed deciduous woodland to help screen the road from the cottages at Pitmillan and to create a minor feature of biodiversity value in this open intensive agricultural landscape.

LV58. Ch7640 or thereby, the level of the new A90 where it crosses the realigned B9000 would be no more than 2m above existing ground level so as to avoid the creation of an intrusive landform in this open, gently sloping landscape.

LV59. From the realigned B9000 overbridge to ch7800 and between the northbound slip and the realigned B9000 north to ch8350, the islands of land in the junction and the side road slips would be planted with mixed native woodland, covering at least 70% of the available area, and including glades within the larger island, to create an attractive new landscape feature to help integrate the junction into the wider landscape whilst also providing landscape and biodiversity / habitat benefits.

LV60. An area of lower growing and decorative shrubs (species to be determined at detailed design stage) would be planted in front of the house at Fountainbleau (ch8000 to 8050) in order views out are retained.

LV61. A small copse of mixed native woodland would be planted in the triangle of land between the diverted side road and the swale at ch8430S to 8500S to improve the screening of traffic in views from the north.

LV62. A similar clump would be planted on the north side of the SUDS pond at ch8800 for the same reasons.

LV63. A mixed native hedge with standard oak trees would be planted either side of the new link road between Tipperty and the B9000 to help integrate this into the landscape.

11.8 ASSESSMENT OF RESIDUAL LANDSCAPE EFFECTS

In the following assessments, the assessment of effect is that of the impacts of the proposed road on the landscape character zone as a whole. The significance of effect on localised areas within each character zone would inevitably be greater than the significance of the impacts on the area as a whole[154].

11.8.1 Formartine Links – Developed / Developing Landscape Character Zone

Existing Character

This is an area of transition between the rolling moraine landscape inland and the dunes along the coast. It is a rolling and undulating landscape on a small scale, with most views across rather than enclosed by the landform. The groundcover is rough grassland with some areas of gorse scrub, and there are few trees beyond the edge of Balmedie. The combination of the landform, the lack of tree cover, and the dunes and coast combine to give long and open views and generally create a very open, exposed, large scale landscape character. The area directly affected by the new road is adjacent to, and substantially affected by, the existing A90 dual carriageway.

[154] The following paragraphs describe the effects on the character zones traversed by the new road. The fourth zone – Formartine Links – has limited visibility of the new road such that there are unlikely to be any indirect effects on its landscape character.

Nature of Change
The change to the landscape would be the introduction of a new junction and spur roads. With their tight curves, these spur roads are of a similar scale in plan to the undulations in the landscape but with their gentle and even gradients they would introduce a contrast in the landform. Movement and activity in the landscape would be spread over a slightly larger area by the traffic on the junction and the side roads. The lighting columns for the junction would introduce more vertical elements.

Landscape Sensitivity
East of the existing A90, the landscape is one which, although heavily influenced by man, has a degree of wildness and perceived naturalness. With its unimproved rough grazing and gorse scrub, and its open views to the dunes and the coast it would ordinarily be considered sensitive to major infrastructure development. However, the area is zoned for development, and house building has started on the edge of Balmedie. When the rapid change that this new development will bring is taken into account, the area would have to considered as being of slight sensitivity.

Immediately west of the existing A90, this character area merges into the Formartine Lowlands. Although very much influenced by the noise and activity of the existing road, the landscape starts to become more enclosed and of a well-tended rural nature. It would be moderately sensitive to the kind of change caused by the junction development.

Magnitude of Change
The development would permanently reshape the nature and form of a small area of land alongside the existing A90, widening the apparent road corridor. With its street lighting and engineering geometry, the new junction would extend the urban influence of Balmedie a small distance south and southwest. In the context of the existing dual carriageway and the planned expansion of Balmedie, the extension of the road corridor to the east would be a comparatively small change noticeable over a limited area and thus of low magnitude. The extension to the west is into an area not subject to planned change so it would be more noticeable although the area affected is limited because views are restricted by the landform. It would therefore be a change of medium magnitude.

Effect during Construction
During the construction period the activity of large earth-moving and construction machinery, the obvious changing shape of the landscape and the bare earth of the developing junction would combine to create an impact on the landscape **adverse** in nature and of **moderate** significance.

Effect during the Winter in the Year the New Road is Opened
Cessation of construction activity and the grading out and reshaping of the new cuttings and embankments would reduce the landscape impact more than the introduction of moving traffic would increase it. The impact on the character of the area just west of the junction would be moderate and adverse, but on the landscape character zone as a whole it would be **minor adverse**.

Effect in the Summer 15 Years after Opening
It is anticipated that the new junction would be surrounded, at least to the east and south, by new development putting it into an urban or suburban context. The

new entrance planting to Balmedie would have developed to form a locally positive landscape feature in the new context. Overall, there would be a **minor adverse** impact on the landscape character.

11.8.2 Formartine Lowlands – Southern Rolling Landscape Character Zone

Existing Character
This is a rolling and generally well tended agricultural landscape, small scale and enclosed, with a general grain of subtle ridges running east-west. The predominant land use is mixed agriculture, intensively farmed although less so than in the Northern Open Zone. Stone dykes and associated hedgerow planting form many of the field boundaries, although overall post and wire fencing predominates. There is a scattering of traditional farmsteads and generally isolated cottages, mostly with clumps of sheltering trees. There are more extensive mature policy woodlands at Menie House, an extensive area of new woodland planting around Dambrae and north to the east of Delfrigs, and an area of mature woodland just west of Balmedie.

The strong and quite small field patterns, combined with the shorter views in this more rolling topography, create a smaller scale and a degree of intimacy in the landscape. There is a degree of calm and tranquillity in the centre of the area, away from the existing A90. The sea is present in wide views in the east of the area and in glimpses and long views from the west.

The ridge at Orrock forms an important element in views from the south. The ridge at Rashierieve defines the northern limit of the area and is noticeable, although less strikingly so than in views from the north.

Nature of Change
The change to this landscape would be: the introduction of the new dual carriageway approximately parallel to the existing road and between 200 and 500 metres to the west; a number of new over-bridges and under-bridges with short lengths of new side road and; a realignment of the B977, generally running north-south, to the west of Balmedie. There would be no lighting on the road in this landscape zone.

Landscape Sensitivity
The area affected by the new road is a generally pleasant rural landscape which can be categorised as being of ‘ordinary’ to ‘good’ landscape value. There are no landscape designations but parts of the area are clearly locally valued, such as around Dambrae where there is a small network of footpaths within the new recreational woodland as well as a concentration of individual houses. The east-west grain of the landscape makes the introduction of a large north-south linear feature more obvious. These factors, combined with the contrast between the small scale of the landscape and the large scale of the new road make this zone moderately sensitive to the landscape change envisaged.

Magnitude of Change
The new main road would create a strong north-south feature in a landscape whose grain is generally east-west. The constraints on road geometry mean that the road would tend to cut across the grain of the land rather than lie on it and follow the existing contours. This would involve lengths of cutting up to 8m deep and sections of embankment up to 6m high.

The realigned B977 would create another north-south feature, although in an area where the grain of the landscape is less distinct and there are existing north-south lines of walls and hedge. The constraints on the geometry of this road are less onerous, so it can generally lie on the existing landform rather than requiring extensive earthworks.

The new road would cut numerous field boundaries including some stone walls. It would entail the removal of a number of individual trees and a small clump of scrub woodland near Hill of Menie Croft. It would cut across the young woodland at Dambrae and across two of the new ponds.

The traffic on the new road would introduce noise and movement into the comparatively tranquil and secluded landscape of the smallholdings along the valley of the Menie Burn.

The extent to which the landscape would be altered varies, as does the extent to which these changes would be visible. There would be comparatively small changes to the landscape visible over a wide area and a series of noticeable changes over more limited areas. In the context of the landscape character zone as a whole, the new road would be a landscape change of medium magnitude.

Effect during Construction
During the construction period the activity of large earth-moving and construction machinery, the obvious changing shape of the landscape and the bare earth of the cuttings and embankments would combine to create an overall impact on the landscape character zone that is **adverse** in nature and of **moderate** significance. Locally within the valley of the Menie Burn the impact would be major adverse.

Effect Winter Year of Opening
Cessation of construction activity and the grading out and reshaping of the new cuttings and embankments would reduce the landscape impact whilst the introduction of fast moving traffic would increase it, although to a lesser degree. The resulting impact on the character of the Menie Burn valley would be moderate adverse, but the effect on the landscape character area as a whole would be **moderate-minor adverse**.

Effect Summer 15 years after opening
Growth of the roadside planting would do a lot to help integrate the new road into the landscape. At the same time the establishment of the existing woodlands in the Menie Burn area would mean that the road would be less visible in the landscape. The overall long-term landscape effect of the new road would be **minor adverse**.

11.8.3 Formartine Lowlands – Northern Open Landscape Character Zone

Existing Character
This is a landscape of very gently rolling intensive farmland with some areas of young conifer plantation. Fields are large and weakly contained, and views are open and extensive. There are few trees except at settlements. Outwith the settlements, it is a very open and large scale landscape, bleak and exposed in

poor weather. There is a scatter of generally isolated farmsteads and cottages, and two small villages of more modern housing at Tipperty and Foveran.

Nature of Change
The change to this landscape would be: the introduction of the new dual carriageway generally parallel to the existing road about 200 to the east, except at Rashierieve where it diverges to the west; a number of new over-bridges and under-bridges with short lengths of new side road; an extension and realignment of the A975 to a new grade-separated junction northwest of Rashierieve; a realignment of the B9000 to a new grade-separated junction at Fountainbleau and; a short minor link road from Tipperty south to the B9000. There would be no lighting on the mainline in this landscape zone, although there would be lighting required at the roundabout at the junction at Fountainbleau.

Landscape Sensitivity
The area affected by the new road is a large scale open rural landscape with no strong pattern or features, which can be categorised as being of 'ordinary' landscape value. There are no areas which appear to have a particular local value. The existing A90 creates a strong linear feature with noise and almost constant movement. These factors make this zone slightly sensitive to the landscape change occasioned by a new road at or close to existing ground level. The very gentle slopes and open nature however, would make it moderately sensitive to the introduction of significant vertical elements such as bridges and embankments, which is why the junction form is controlled by mitigation commitments.

Magnitude of Change
The new main road would create a strong north-south feature parallel to, and reinforcing, the line of the existing A90. The road would lie close to existing ground level, although the constraints on road geometry mean that it would tend to even out surface irregularities, cutting into the slight rises and being banked up across the slight hollows. This would involve lengths of cutting up to 6m deep and sections of embankment up to 6m high. The one place where this would be significantly noticeable is the embankment between Kirkhill and Aikenshill.

The new grade separated junctions at Rashierieve and Fountainbleau would create more visible features, although these have both been designed with the side roads passing under the main line in order to reduce the amount of upstanding landform.

The new road would cut numerous field boundaries but the scale of the fields is such that it would make little difference to the overall pattern of the landscape. It would entail the removal of a number of small trees at Fountainbleau and a corner of some recently planted woodland at Oldmill Croft. However, neither of these is really significant in the landscape.

The traffic on the new road would introduce noise and movement into the comparatively tranquil landscape between Kirkhill and Aikenshill.

The new road, side roads and junctions would entail generally small changes to the landscape but ones which would visible over a comparatively wide area and more noticeable changes more limited areas. In the context of the zone as a whole, the new road would be a landscape change of medium magnitude.

Effect during Construction
The activity of large earth-moving and construction machinery, the obvious changing shape of the landscape and, particularly, the intensive activity at the junctions would combine to create an overall impact on the landscape character zone that is **adverse** in nature and of **moderate** significance.

Effect Winter Year of Opening
The grading out and greening up of the new cuttings and embankments, along with the cessation of construction activity and therefore constant change would reduce the landscape impact. As there is existing activity from the traffic on the old road, moving this onto the new road would have no material impact on the landscape.

The overall effect on the landscape character area as a whole would be **adverse** in nature but of **minor** significance.

Effect Summer 15 years after Opening
Growth of the roadside planting would establish new landscape features, beneficial to the overall landscape character, and reduce the wider visibility of the road in the landscape slightly. The net result would be that whilst there would remain a landscape impact of **minor** significance, it would be **neutral** in nature.

Table 11.6: Summary of Landscape Effects

Landscape Character Zone	Landscape Sensitivity	Magnitude of Change	Landscape Effect[155]		
			During Construction	Winter, year of Opening	Summer, 15 Years after Opening
Formartine Links: Developed / Developing	Slight to Moderate	Low to Medium	Moderate adverse	Minor adverse	Minor adverse
Formartine Lowlands: Southern Rolling Zone	Moderate	Medium	Moderate adverse	Minor adverse	Minor adverse
Formartine Lowlands: Northern Open Zone	Slight	Medium	Minor adverse	Minor adverse	Minor neutral

11.9 ASSESSMENT OF RESIDUAL VISUAL EFFECTS

11.9.1 Introduction
The visual effects anticipated at the identified receptors are set out in the form of a long table, the Visual Effect Schedule, in Annex 11.1 and as series of drawings (Figures 11.21a-d, the Visual Impact Drawings). Photomontages from selected viewpoints (Figure 11.9) are shown in Figures 11.10-13 and a number of photographs as Figures 11.14-20. Additional photographs of the scheme area are included in Annex D.

[155] Note that these are the effects of the proposed road on the Landscape Character Zones as a whole. Locally within the zones, the impacts are likely to perceived as more significant. See "Assumptions and Technical deficiencies" in Section 11.5.2

The Visual Effect Schedule is a table giving the location, distance from the road, current view and visual effect, for every receptor or group of receptors likely to receive a visual impact.

The following paragraphs give an overview of the impacts, assessed both 'as new' – in the winter of the year of opening, and 'when mitigation planting has established' – in the summer fifteen years after opening.

Figure 11.14. View from the edge of Balmedie Golf Course, looking north. South Folds in the foreground, The Holdings in the background. The new junction between the two would result in moderate adverse visual effects on both in the short term, reducing over time as the mitigation planting becomes established

Figure 11.15. View from adjacent Orrock House looking towards the Cock and Bull and adjacent cottages. New road nearer than the existing would give rise to moderate adverse visual effects

Figure 11.16. View from the rear of the Cock and Bull. New road on slight embankment across the whole of the view (across the fields in the middle-ground), gives rise to major adverse visual effects in the short term, reducing to moderate as mitigation matures

Figure 11.17. View from Newtyle. New road would be out of sight. Heavy traffic on the existing road would substantially reduce, giving rise to major beneficial visual effect

Figure 11.18. View from Kirkhill. New road on embankment (tapering down from right to left) across the whole of the view (towards the rear of the ploughed field), gives rise to major adverse visual effects in the short term, reducing to moderate as mitigation matures

Figure 11.19. View from Foveran School. New road across the whole of the view, parallel to the existing but behind the foreground bushes. Beneficial visual effects of the substantial reduction in traffic on the road in the foreground would slightly outweigh the adverse effects of increased amount of road that would be visible, giving overall a minor beneficial visual effect

Figure 11.20. View from Fountainbleau. New road parallel to the existing, on almost the same line. Old road in the foreground becomes the B9000. New woodland screen planting either side of the view shown would eventually screen the road, whilst shrub planting on what is currently a grass verge would reduce the visibility of the road whilst allowing views out. Overall a minor adverse visual impact primarily arising from the increased visibility of traffic on the B9000

11.9.2 Permanent Effects

Because of the scattered nature of development through the road corridor, there would be a similarly broad scatter of visual impacts on housing.

Unusually, within this study area there are virtually no receptors at places of outdoor recreation. The recreational use of the area is both diffuse and sparse, and there are no major footpaths and no major viewpoints. The site of the proposed junction south of Balmedie may be visible in the distance from a corner of the Balmedie Country Park but the area between the park and the junction is zoned for development and this is currently under way. It is anticipated that the junction site is unlikely to be visible by the time construction works would commence.

At the south of Balmedie, the new junction would, when new, give rise to moderate adverse visual effects at South Folds, on the line of houses at The Holdings, and at the houses above Old Road at the entrance to Balmedie (see Photograph 3). When the mitigation planting has established, this effect would have reduced to minor adverse.

The minor links to the south of Balmedie would give rise to minor adverse effects, almost negligible in the context of the existing A90, except at the golf clubhouse where there would be a moderate effect, reducing to minor over time as mitigation becomes established.

The realigned B977 would, when new, give rise to minor adverse effects on the houses along the existing B977 and at Keir Farm. These would change little over time as there would be little or no planting as mitigation.

From north of Balmedie to Hill of Menie (approximately ch 0+600 to 2+500) most of the properties to the west of the existing A90 and close to the new road (within about 300m) would be subject to moderate adverse visual effects when the road is new. At South Orrock, where there is mitigation planting, visual effect would diminish to minor adverse when this has established. Elsewhere, because of the open landscape and the nature of the setting of Orrock House, there is no mitigation planting, so the visual impact would not diminish over time, although people would become accustomed to the presence of the road. The Cock and Bull and adjacent cottages would be subject to major adverse visual effect when the road is new, diminishing to moderate adverse. The properties further to the west would be subject to minor adverse visual effects. The houses to the east of the existing A90 would generally have beneficial visual effects, minor and moderate both when new and when mitigation planting has established for the houses at Belhelvie. The Bungalow (ch 0+650) would be subject to minor adverse visual effect when the road is new, but moderate beneficial when mitigation planting has established.

Where the road crosses the shallow valley of the Menie Burn (approximately ch 2+500 to 3+000), Seven Acres and Stoneyards Cottages would be subject to major adverse visual effects, with that at Seven Acres diminishing to moderate adverse when mitigation planting has established. Stoneyards and Cowhill would all be subject to moderate adverse visual effects when the road is new, reducing to minor adverse when mitigation planting has established. As before, properties further west would be subject to minor adverse visual impacts, and there would be a minor beneficial visual effect on most of the properties to the east of the

road. The exceptions to this are the steading conversion at Dambrae and the southernmost house at Hill of Menie, which would both be subject to moderate adverse visual effects when the road was new, although that at Dambrae would diminish to minor adverse when mitigation planting has established.

Where the road crosses the ridgelines at Aikenshill and Kirkhill (approximately ch 3+600 to 4+400) there would be minor to moderate adverse visual impacts to the houses at Aikenshill (no reduction over time as no mitigation planting) but a major adverse visual effect to Blair Lodge, on the west side of the road, reducing to moderate adverse when mitigation planting has established.

Moderate beneficial visual effects would occur at all the properties along the existing A90 from Newtyle to Rashierieve when the bulk of the traffic, and particularly the heavy goods vehicles, is transferred to the new road.

Around Foveran, there would generally be slight and moderate beneficial visual effects when the road is new and generally moderate beneficial impacts when mitigation planting has established. The main exceptions to this are at Mill of Foveran and at Ardgill, which will be subject to moderate adverse visual effects when the road is new, reducing to minor adverse when mitigation planting has established.

Between Foveran and the new Tipperty Junction the properties to the east of the road at Pitmillan would be subject to slight adverse visual effects when the road is new, reducing to slight but neutral when mitigation planting has established. Minor beneficial visual effects would occur at West Pitmillan when the bulk of the traffic is transferred to the new road.

Fountainbleau, at the Tipperty Junction would suffer from slight adverse visual effect when the road is new, but this would become moderate beneficial because of the effective screening from the new road (see Photograph 23).

There would be almost no visual impact north of the Tipperty Junction, because the online dualling seen against the slope of the hill from Tipperty or from Fornety would look very little different to the existing taper and single-carriageway roads. The only exception to this is the house at the south end of the village. This would be subject to a moderate adverse visual effect from the local access road when new, reducing to minor adverse impact when the mitigation planting has established.

11.9.3 Construction Period Effects

As a general rule, the visual impacts during the construction period would be similar in nature and slightly greater in magnitude to those at the date of opening. The greater magnitude of impact is caused partly by the ‘shock of the new’ – where the viewer perceives the actual change in progress. It is also caused by the nature of the construction process: cutting and embankment sides raw earth scars before they are properly shaped up and grassed over or planted; temporary road diversions and materials heaps visible; large machinery moving, with orange flashing lights.

Particular points where the construction period impact would be greater are:

- at the junctions and bigger burn crossings where piling rigs and cranes might be required for bridge construction;
- at Balmedie Junction where there may be road diversions required;
- at the site compound (or compounds), where there would be a concentration of activity, and the physical presence of portacabin style temporary buildings, working areas, car parking and security fencing and lighting.

11.9.4 Operational Effects

The operational impacts of the proposed road are caused by the presence of moving traffic, headlights at night, and road lighting being switched on at night.

The only road lighting proposed for the new A90 is associated with the roundabouts at the Balmedie Junction and at the B9000 Junction. As the existing road in both locations is already lit, the only operational impact would be an increase in the area over which lighting at Balmedie Junction is visible from The Holdings and from South Folds. The impact of this would be minor in comparison with the overall visual effect of the scheme.

Those receptors which experience permanent visual effects from the proposed road are likely to experience additional visual impacts from both views of moving traffic during the day and of headlights at night.

In most situations the operational effect of the proposed road would be a slight adverse visual effect. The main exception to this is where the road is very close to the receptor such that the view is primarily beyond the road but interrupted by moving traffic. Properties alongside the existing A90 (The Bungalow, Sydney Cottage, Seaview, West Menie Lodge, Delfrigs, Newtyle Stables, Rashierieve, Blairythan, parts of Foveran) would benefit from moderate or major beneficial operational visual effects when most of the traffic was removed from the existing road. Receptors close to the proposed road which would be subject to a moderate adverse operational effect include Seven Acres, Stoneyards Cottages and Blair Lodge.

False cuttings have been created at certain locations, primarily for noise mitigation reasons, which have the added benefit of reducing or eliminating the view of moving traffic or headlights from certain properties. Similarly, much of the mitigation planting is designed to screen or filter views of traffic from specific properties.

Receptors where bunding or noise fencing would reduce the operational impacts include Seven Acres, Stoneyards Cottages, Aikenshill, Blair Lodge, and the roadside properties between Blairythan Smithy and the Foveran Burn if the potential land raise for disposal of surplus soil is carried through in the detailed design.

Receptors where mitigation planting would reduce or eliminate the operational effects by year 15 include South Folds, The Holdings, The Bungalow, Seven Acres, Stoneyards Cottages, Blair Lodge, Foveran School and Fountainbleau.

In some situations, particularly in more distant views, the main impact of the road is the operational impact – the view of moving traffic of the road – where the view

of the empty road would only be a slight line or break in the landscape. Examples of this are Overhill and Ardgill.

11.10 SUMMARY

11.10.1 Findings of the Assessment

- The proposed road runs through a rural landscape which is generally small scale and rolling in the area south of the ridge at Aikenshill. North of this ridge, the landscape becomes much broader, more open and large scale (see Photograph 15). Development is concentrated at Balmedie, Foveran and Tipperty but there is a broad scatter of groups of houses and of individual houses throughout the area.
- In the southern half of the area, the new road would create a strong north-south feature in a landscape which has a generally east-west grain. In the northern half of the area, the new main road would run parallel to the existing road reinforcing the north-south axis which already exists.
- There are few strong landscape elements such as woodlands affected by the new road, although the pattern of small field boundaries in the southern half of the area would be disrupted.
- The scattered nature of development leads to a similar scattering of visual impacts. As far as possible, the new road has been designed to sit low in the landscape and, in particular, all junctions have been designed so that the main road with its high load headroom requirements passes over the side roads. This has minimised the extent to which structures stand up in the open landscapes and reduced the potential visual impact of the junctions.
- In most situations the residual effects of the scheme would be more related to the proximity of the new road and its intrusion into a rural or semi-rural landscape rather than to the actual obstruction or blocking of views by the road or structures.

11.10.2 Significant Effects

- At the scale of the landscape character areas defined for this study, the new road would have a moderate adverse effect on the landscape of the southern half of the study area during the construction period.
- At a more local scale, there would be a major adverse effect during the construction period on the landscape of the more enclosed and self-contained valleys such as that to the west of The Holdings or the valley of the Menie Burn around Dambrae.
- These effects would all reduce over time as the mitigation matures, such that the eventual overall landscape effects would be minor, although in local areas they would remain moderate.
- The road when new would have a major adverse visual effect on No 6 The Holdings, on the Cock and Bull restaurant and the two adjacent cottages, on Seven Acres and Stoneyards Cottages, and on Blair Lodge at Kirkhill. Except at No 6 The Holdings, the visual effect would reduce to moderate adverse as the mitigation planting matures and partially screens the traffic. At No 6 The Holdings the effect is likely to remain major although this may be able to be reduced depending on the outcome of the detailed mitigation design exercise.
- There would be moderate adverse visual effects at the time of road opening from the new A90(T) road, or from the minor link roads, at: the clubhouse for the East Aberdeenshire Golf Club; at South Folds and at the Holdings; at Old Road in Balmedie; to most of the properties west of the old road and within

about 300m of the new road from Balmedie to Hill of Menie, including Orrock House; to Stoneyards and Cowhill; to the line of houses at Aikenshill (see Photograph 14) and; to Mill of Foveran and Ardgill. Where mitigation planting is proposed, this effect would generally reduce over time to minor adverse. On the other hand in the open landscapes where screen planting would be inappropriate, such as at Orrock House and at Aikenshill, this effect would remain unchanged except in so far as perceptions of change reduce as the viewer gets used to the new view.

- There would be moderate beneficial impacts on most of the properties immediately abutting the existing A90 when traffic transfers to the new road, and at The Bungalow, just north of Balmedie, there would be a moderate beneficial impact when the mitigation planting on the site of the grubbed up old road has developed.

APPENDIX 11.1

VISUAL EFFECTS SCHEDULES

Annex 11.1: Visual Effect Schedule

In the following schedule, the 'types' of receptor are as classified follows:
R - Residential, normally a highly sensitive receptor
O - Open space or Outdoor recreation site, normally a highly sensitive receptor
T – Transport, normally a moderately sensitive receptor.
B - Business or indoor recreation site, normally slightly sensitive receptors (except restaurants and hotels)
Where there is more than one type of receptor at an assessment location, the most sensitive is assessed.

The overall impact given in these tables and shown on the Visual Impact Drawings (Figures 11.21a to 11.21d) is that which the assessor considers that the ordinary receptor will perceive. It combines the permanent impact of the physical presence of the new road with the operational impact of traffic movement. This is a technical distinction that is unlikely to be made by the ordinary observer who is concerned with the overall visual effect of the introduction of a busy new road.

Type	Ref	Location	Distance	Current View Towards Proposals	Visual Effect in the Year of Opening (Winter)	Visual Effect 15 Years after Construction (Summer)
R	1	Wester Hatton Timber Yards	50m	Existing A90 across immediate foreground, then rolling rough pastures falling away gently towards the sea.	New link road would be visible on the far side of the existing A90, slightly extending the amount of road surface and marginally increasing the amount of traffic visible. Highly sensitive receptor subject to a low magnitude of change. Minor adverse effect	Copse and hedge between the link road and the existing A90 would reduce the visibility of the former to the extent that the change would become almost negligible although still visible. Minor but neutral effect
B	2	Easter Hatton Landfill Site	30-80m	Narrow band of rising rough ground then the existing A90 across the view, backdropped by rising and rolling farmland	New link road and associated cut slopes would be clearly seen, slightly increasing the amount of road surface and marginally increasing the amount of traffic visible. Slightly sensitive receptor subject to a low magnitude of change. Minor adverse effect	Woodland planting on the cut slopes would have matured slightly reducing the visibility of the existing A90 but not affecting the view of the link road. Minor but neutral effect
R	3	Jandel[156]	30m	Golf club access road in the immediate foreground, then neatly manicured golf club grounds, car park and clubhouse. A90 in middleground in cut but slight views of traffic	Access road would be extended across the driving range to the left of the view; amount of traffic passing would increase slightly. Slightly sensitive receptor subject to a low magnitude of change. Minor adverse effect	Landscape treatment to the new link would have matured improving its integration into the landscape. Minor adverse effect

[156] There may be oblique views of slight road widening for the Balmedie Junction slip roads or more distant views of the Millden Link Road from the properties at Millden but these changes would be negligible in the context of the existing A90

Type	Ref	Location	Distance	Current View Towards Proposals	Visual Effect in the Year of Opening (Winter)	Visual Effect 15 Years after Construction (Summer)
B	4	East Aberdeenshire Golf Clubhouse	20m	Open views across golf course	New link will cut across foreground of view on slight embankment, visually separating the clubhouse from the golf course. Moderately sensitive receptor subject to a medium magnitude of change, giving a **moderate adverse** effect	Landscape treatment to the new link would have matured improving its integration into the landscape and reducing the effect to minor adverse
R	5	SW of Balmedie (South Folds, Almardo and adjacent)	50-100m from junction	Existing A90 dual carriageway almost immediately in front of house, rolling fields and small valley to side and rear, ground rising to a near horizon	Minor change in front of the houses, potentially moderate where access to Almardo affects adjacent garden (subject to detailed design). To side, new roundabout cut into small hillock, cross junction road generally out of site because of topography but high sided traffic visible, realigned B977 visible to rear, following line of small valley. Lighting at junction spreads extent of road lighting from one side to two sides of group of houses. Highly sensitive group of receptors subject to medium magnitude of change. **Moderate adverse** effect	Extensive screen planting between houses and junction would have matured sufficiently to screen all but highest vehicles from view, reducing impact, except at night where extended road lighting remains visible. Making good of gardens affected by revised access would have established Significance of change would reduce to minor adverse effect, although remain **moderate adverse** at night
R/O	6	Balmedie, adjacent Old Road	Under 50m	Short views onto existing Old Road, semi-rural village entrance, road in scrubby cutting below houses, short views contained by mature coniferous copse on opposite side of road	Road realigned slightly cutting into mature coniferous copse, giving raw edge, and opening up views to the south along the straightened road Highly sensitive receptor subject to medium magnitude of change **Moderate adverse** effect	New planting on the cutting slopes matured sufficiently to blend in the changes, and decorative planting along the entrance would be well established Significance of change would reduce to minor and maturing design improve outlook: minor beneficial
R	7	Nos 1 – 5 The Holdings	200m	Open view across rolling fields, flattening out away from the houses to dunes and the sea. Lights and traffic of existing A90 across middle-ground, roofs of houses in hollow	New junction in middle-ground, just hidden by lie of the land but lighting and high sided traffic visible. B977 realignment partially visible along rural valley Highly sensitive group of receptors subject to medium magnitude of change. **Moderate adverse** effect	Planting around the junction should have matured to screen both the junction and some of the existing road. Significance of change would reduce and maturing design improve outlook: minor effect, some aspects beneficial, some adverse, overall neutral
R	8	No 6 The Holdings	0m	Direct view across garden to the existing A90 with heavy	Garden in the foreground halved in depth. Direct view of new A90(T) with vehicles even closer than	To be subject to detailed design exercise which may be able to reduce the impact to moderate.

Type	Ref	Location	Distance	Current View Towards Proposals	Visual Effect in the Year of Opening (Winter)	Visual Effect 15 Years after Construction (Summer)
				traffic clearly visible	before but slightly better screened by increased garden wall height. Highly sensitive receptor subject to a medium magnitude of change in the immediate foreground. **Major adverse** effect	Unless or until this is confirmed, considered as an ongoing **major adverse effect**
R/B	9	Keir House, Farm and adjacent	350m	Filtered views through line of deciduous trees to open rolling fields with few trees	New side road, following the lie of the land would cross the middle-ground, just below the horizon. Traffic would be visible but the road would be hardly noticeable. Highly sensitive receptor subject to low magnitude of change Minor adverse effect	No substantial change anticipated Minor adverse effect
B	10	Belhelvie Church	150m side-road 500m main line	Rolling open hills with little tree cover	Realigned minor across part of the centre of the view. Slightly sensitive receptor subject to low magnitude of change. Minor adverse effect	Roadside hedges would have matured and the road would appear more integrated into the landscape but remain minor adverse effect
B	11	Victoria Hall	50m side-road 500m main line	Along the B977, flatter land in the foreground, rolling ground in mid- and background	Realigned minor road in foreground, intrusive because of obvious change Moderately sensitive receptor subject to low magnitude of change Minor adverse effect	Roadside hedges would have matured and the road would appear more integrated into the landscape but remain minor adverse effect
R	12	House on B977 by Drumhead Lodge	300m from A90, 200m from new B977	Open rolling fields rising gently away from house	Minimal change to the A90, new B977 visible in middle-ground crossing the horizon in slight cut Highly sensitive receptor subject to low magnitude of change: minor adverse effect	No substantial change anticipated Minor adverse effect
R	13	Drumhead Lodge	120m (60m from edge of garden)	House and garden entirely enclosed by substantial screen planting, with no views out except from a side track	New road would not be visible from house or the main parts of the garden No effect	No substantial change anticipated No effect
R	14	The Bungalow	30m to	Direct view onto existing A90	Existing road reduced in width, new road across	New planting on the area of abandoned old road

Type	Ref	Location	Distance	Current View Towards Proposals	Visual Effect in the Year of Opening (Winter)	Visual Effect 15 Years after Construction (Summer)
			existing, 120m to new	and moving traffic in foreground, unscreened, then open rolling pasture gently rising to a middle-ground horizon with clumps of trees around farm	whole view but further away although slightly higher Highly sensitive receptor subject to low magnitude of change Minor adverse effect.	would have matured sufficiently to substantially screen the new road and remove views of most traffic so, despite the loss of the open outlook ,the overall effect is **moderate beneficial**
R	15	Un-named cottage	300m	Open view across fields, rising gently to a horizon in the middle-ground, with clumps and lines of trees. Existing A90 across the entire middle-ground of the view	New road parallel to the existing and further away although slightly higher elevation. Effectively the same view of the road as existing. Highly sensitive receptor but change of sufficiently low magnitude that effect is minor adverse	No substantial change anticipated Minor adverse effect
R/B	16	Cock and Bull and two adjacent cottages	120m	Intimate landscape of small rolling fields with trees, gently rising to near horizon at Orrock House	New road across the whole of the view, slightly above the level of the properties. High sided vehicles likely to be visible above the horizon Sensitive receptors (cottages) subject to change of medium magnitude, **major adverse** effect	Clumps of woodland planting would reduce the extent to which the new road is visible and help to integrate it in the scene, reducing overall effect to **moderate adverse**
R/B	17	South Orrock		Broad open view, fields falling away in the foreground, to panorama of dunes, coast and Blairton Estate woodlands. Existing A90 busy feature across the middle-ground	New road almost parallel to the existing, nearer and larger, more noticeable in the view but not a fundamental change. Access road to farm and houses in new cutting with under-bridge. Highly sensitive receptor subject to medium magnitude of change: **moderate adverse** effect	Clumps of woodland planting along the near side of the road would have matured sufficiently to help blend the road into the landscape and slightly filter views of the traffic, reducing effect to minor adverse
R	18	Mill House, Mill of Blairton (2 houses)	700m	Open view across newly planted woodland scattered houses, traffic on existing A90 in the background	Slightly more distant view of traffic on new road, mostly in cut, view of less traffic on existing road. Negligible effect None	Trees in foreground would have matured to block views None
R	19	Ceol-na-Mara	500m	Filtered views through trees to gently rising, rolling fields, distant traffic on the existing A90	New road further away generally parallel to existing, partly hidden in cut. Reduced traffic on the existing road. Low magnitude of change to a highly sensitive receptor, minor beneficial effect	No substantial change anticipated, minor beneficial effect

Type	Ref	Location	Distance	Current View Towards Proposals	Visual Effect in the Year of Opening (Winter)	Visual Effect 15 Years after Construction (Summer)
R	20	Sidney Cottage	230m	View across existing A90 with busy traffic to steeply rising open fields and near horizon	New road out of site (in cutting behind rise) directly in front of cottage but across part of middle-ground to the south. Most traffic removed from existing road in immediate proximity. Highly sensitive receptor subject to a medium degree of change, partly adverse, mostly beneficial. Overall **moderate beneficial** effect	No substantial change anticipated, **moderate beneficial** effect
R	21	Seaview	280m	View across existing A90 to steeply rising open fields and near horizon	Most traffic removed from existing road. New road out of site (in cutting). Highly sensitive receptor subject to a medium degree of change, **moderate beneficial** effect	No substantial change anticipated, **moderate beneficial** effect
R	22	Pettens Farmhouse	400m	Open view across fields to group of houses and ruined church, with mature trees. Traffic on existing A90 just seen in the background	Possible more distant view of high traffic on new road in cut, further than existing, less view of traffic on existing road. Low magnitude of change to a highly sensitive receptor, minor beneficial effect	No substantial change over time Minor beneficial
R	23	Orrock House	100m at closest	Pastures with dry-stone walls in the foreground gently falling away, broad open prospect of fields, the coast and dunes, Blairton Estate and groups of houses. Existing road runs diagonally across view in middle- and background	New road runs diagonally across the view approximately parallel to the existing but much larger and also visually larger because much closer. Change of medium magnitude to a highly sensitive receptor, giving a **moderate adverse** effect	No substantial change over time, continuing **moderate adverse** effect
R	24	Orrock Mains	150m	Gently rolling fields with stone walls, fairly level to a middle-ground horizon, distant views of the sea beyond. A few clumps of trees, particularly at Orrock House	New road in cutting across middle-ground. Road not visible but tall vehicles probably visible above the horizon. Overbridge for the access land visible above the horizon. Change of medium magnitude to a highly sensitive group of receptors, giving a **moderate adverse** effect	No substantial change over time, continuing **moderate adverse** effect
R	25	Damhead of Orrock and Seavista	750m	Open view across rolling fields with woodland in middle- and background.	Traffic on new road would be just visible as it passes over the higher ground north of Orrock, potentially view of high sided vehicles against distant horizon.	Roadside clumps of trees would screen parts of view of traffic, effect remains as minor adverse

Type	Ref	Location	Distance	Current View Towards Proposals	Visual Effect in the Year of Opening (Winter)	Visual Effect 15 Years after Construction (Summer)
				Existing A90 not visible	Change of low magnitude for highly sensitive receptors: minor adverse effect	
R	26	Crestview	1km	Open view across rolling fields, clumps of trees inc at Orrock towards background. Existing A90 not visible	Traffic on new road would be just visible as it passes over the higher ground north of Orrock, potentially view of high sided vehicles against distant horizon. Change of low magnitude for a highly sensitive receptor: minor adverse effect	Little change over time, continuing minor adverse effect
R/B	27	Boghead, Colpnay View		Open prospect across rolling bare fields falling to the coast, dunes and the sea. Existing road heard but not seen. One big clump of conifers	New A90 would cut across most of the middle- to back-ground of the view, mainly in cut but possibly with high-sided vehicles visible. Side road bridge visible, but not above horizon. Change of low magnitude to highly sensitive receptors, overall a minor adverse effect	Little change over time, continuing minor adverse effect
R	28	Hill of Menie Croft	200 m	Open views across fields to trees of Menie Estate and the sea	Road passes across the slight valley in the middle ground of the view, traffic may protrude above the horizon, cars may be hidden by false cutting. A highly sensitive receptor subject to medium magnitude of change: **moderate adverse** effect	Roadside planting and possibly offsite planting would substantially screen the new road, reducing the effect to minor adverse
R/B	29	Wardhead and Pet Cemetery	300 m	View across rolling fields to the sea (rear corner view from garden to valley at Dambrae	The road would be little visible because of the lie of the land, except in a corner view from the garden. The tops of tall trucks may be visible above the horizon. A highly sensitive receptor (the house) subject to low magnitude of change: minor adverse effect	Maturing planting would reduce the visibility of the road from the corner of the garden, effect would remain minor adverse
R/B	30	Newton of Menie (farm)	700 m	View across rolling fields to the sea, intermediate horizon marked by trees at Stoneyards	Traffic on the new road may be visible above the middle horizon. A highly sensitive receptor (the farmhouse) subject to low magnitude of change: minor adverse effect	Growth of screen planting and adjacent woodland would reduce visibility of traffic, effect would remain minor adverse
R/B	31	Corner house by Newton of Menie	600 m	Similar view to Newton of Menie, although focussed down the Menie Burn valley	As Newton of Menie, minor adverse	As Newton of Menie, minor adverse
R	32	Seven Acres	250m	View down a broad shallow	New A 90 would cross the middle-ground on a slight	Planting on the false cuttings and particularly in the

Type	Ref	Location	Distance	Current View Towards Proposals	Visual Effect in the Year of Opening (Winter)	Visual Effect 15 Years after Construction (Summer)
				valley enclosed to the trees of Menie Estate and over these to the sea. Young trees across part of the valley enclose further views to the north east. Traffic on the existing A90 clearly visible in the middle-ground	embankment, much closer than the existing road, although false cutting would partially screen traffic from view. High sided vehicles would be seen above the horizon. Existing minor road running past the house lowered into cutting to pass under the new road. A change of medium to high magnitude to a highly sensitive receptor with an upstairs window that appears designed to take advantage of this view, therefore a **major adverse** effect	area between the new A90 and the access to Hill of Menie Croft would have matured sufficiently to substantially screen the traffic on the new road (although this may then block longer views to the sea) reducing the effect to **moderate adverse**
R	33	Stoneyards Cottage	300 - 450 m	Open views SSE over rolling fields to distant sea	Road passes obliquely left across small part of middle horizon, traffic may be visible above the horizon. Views directly to nearer part of road screened by neighbouring buildings and trees. A highly sensitive receptor subject to a medium to low magnitude of change: **moderate adverse** effect	Growth of screen planting would substantially reduce visibility of traffic, reducing the effect to minor adverse
R/B	34	Stoneyards Farmhouse	250 m	Open views SE over rolling fields to distant sea	Road passes across part of the middle horizon, disappearing into cut seen obliquely. High sided traffic may be visible above the land horizon, against the sea. Low sided traffic likely to be mainly screened by false cut. A highly sensitive receptor subject to a medium magnitude of change: **moderate adverse** effect	Growth of screen planting would substantially reduce visibility of traffic, reducing the effect to minor adverse
R	35	Stoneyards (pair of semi-detached cottages)	100 m	Very open view across rough grazing dropping gently away towards the Menie Estate woodlands and the sea. Traffic on the existing A90 visible in the mid-ground	Road passes across the foreground of the view at grade or in a slight cutting. Embankment and under-bridge at Dambrae also closely visible. False cutting would partially obscure views of traffic but high sided vehicles clearly visible, possible above the horizon. A change of high magnitude to a highly sensitive receptor, therefore a **major adverse** effect	Growth of screen planting would substantially reduce visibility of traffic but would enclose and shorten the current long and open views, effect would remain as **major adverse**
R	36	Hill of Menie (house at south end)	200 m	View south across rolling fields, existing road visible but partly screened by trees	Oblique view into new road cutting. Change of medium magnitude to a highly sensitive receptor, overall a **moderate adverse** effect	Little change over time, continuing **moderate adverse** effect
R	37	Hill of Menie	250 m	Restricted view towards new	Most traffic removed from close views, giving a minor	Little change over time, continuing minor beneficial

Type	Ref	Location	Distance	Current View Towards Proposals	Visual Effect in the Year of Opening (Winter)	Visual Effect 15 Years after Construction (Summer)
		(group of four houses)		road, open prospect across busy existing road then fields, to the sea	beneficial effect	effect
R	38	West Menie Lodge House	350m	Short view across the existing busy A90 to gently rising fields to horizon in the middle-ground. Scattered houses and extensive new woodland planting	New road would run across the middle-ground of the view on a slight embankment, with false cutting reducing the visibility of cars, whilst most traffic would be removed from the fore-ground. Overall a change of low magnitude with some beneficial and some adverse aspects. A minor effect, neutral in character	Planting on the new road embankment and in other parts of the view would mature substantially reducing the visibility of the new road and the adverse aspects of the change, with the result that the effect whilst still minor would on balance be beneficial
R	39	Dambrae (existing cottage)	150 m	Limited view towards new road, existing road clearly visible at foot of long garden	New road not readily visible. Traffic removed from existing road in full view would be a positive change of low magnitude for a highly sensitive receptor: minor beneficial effect	Little change over time, continuing minor beneficial effect
R	40	Dambrae (steading with planning permission for conversion)	100 m	Clear side and garden view of new road on slight embankment with traffic visible against the sky	Close view of moving traffic, although part screened by false cutting. A change of high magnitude to a highly sensitive receptor, overall a **major adverse** effect	Roadside planting and adjacent new woodland would substantially screen the new road, eventually reducing the effect to minor adverse
R	41	Delfrigs (group of houses)	400 m	Broad but short views west up rising ground into the edge of new forestry. For all but one house, the view is across the busy existing A90	Traffic removed from the existing road in the foreground, new road distantly visible across the conifer plantation. A positive change of low magnitude for a highly sensitive receptor: minor beneficial effect	Growing trees would further reduce if not eliminate the view of the road and traffic, continuing minor beneficial effect
R	42	Semi-detached cottages on corner of track to Aikenshill.	300 m	Short dull views up gently rising pasture-land to a near horizon from the rear of the house. (very pleasant open views to sea from front of house, with existing A90 in foreground)	New road across the whole of the middle-ground of the view, close to the horizon but hidden by false cutting, although high sided traffic visible above the skyline. Sensitive receptors subject to adverse change of medium magnitude to the rear (**moderate adverse** effect) but with improvements to view from front of the house as traffic removed from existing road. On balance, a minor adverse effect	Little change over time, continuing minor adverse effect
R/B	43	Cothill		Open views across rolling fields with groups of trees,	Road significantly more distant but on higher ground, so possibly distant view of high sided vehicles. A	Roadside planting and intervening woodland north of Dambrae would have matures screening traffic

Type	Ref	Location	Distance	Current View Towards Proposals	Visual Effect in the Year of Opening (Winter)	Visual Effect 15 Years after Construction (Summer)
				existing A90 just visible	change of low magnitude for a highly sensitive receptor: minor adverse effect	entirely, a positive change which would make the effect minor beneficial
R	44	Aikenshill (terrace of 6 houses, farm and farmyard)	300 m	Open view west across rolling pasture, mainly to horizon in the middle-ground, distant horizon across part of view. (pleasant open views to sea from rear of houses with existing road hardly visible)	New road would cross the whole of the view to the west, partly on embankment, close to or possibly forming the horizon. Most traffic screened by false cutting but high-sided vehicles may be visible above the horizon. Sensitive receptors subject to adverse change of medium magnitude, a **moderate adverse** effect	Little change over time, continuing **moderate adverse** effect
R	45	Newtyle Stables (group of four detached houses)	750 m	Short to medium views up steeply rising ground, with some screening trees in the immediate foreground and broad views of traffic on the existing A90 immediately beyond	New road well away to the west, negligible effect on these houses. Substantial reduction in traffic visible on existing road. Sensitive receptors subject to positive change of medium magnitude, a **moderate beneficial** effect	No further change over time, continuing **moderate beneficial** effect
R/B	46	Rashierieve (south) one house, two work places	450m	View from the front of properties immediately across existing A90 then open fields to the sea. View from rear rural prospect across open fields	Removal of most traffic and movement past the front of the properties, new road and movement of traffic in middle- to back- ground of currently quiet view to the rear. On balance a positive change of medium magnitude for a highly sensitive receptor: **moderate beneficial** effect	Planting on embankment would mature, reducing views of traffic on the new road. A continuing **moderate beneficial** effect
R/B	47	Rashierieve (north) one house, one work place	300m	View from the front of properties immediately across existing A90 then open fields to the sea. View from rear rural prospect across open fields	Removal of most traffic and movement past the front of the properties, new road and movement of traffic in middle-ground of currently quiet view to the rear. On balance a positive change of low magnitude for a highly sensitive receptor: minor beneficial effect	Planting around junction would mature, reducing views of traffic on the new road, so on balance the positive aspect of the change would increase, giving a **moderate beneficial** effect
R	48	Southlea	120m to new A975, 350m to new A90	Broad view filtered through trees around the house, of flattish intensive agriculture, ground rising gently to the west and falling very gently to the north. Existing A975	Realigned A975 visible in fields to the north, beyond the existing road, realigned A90 visible on horizon to NW, but removal of traffic on existing roads closer to receptor likely to be more noticeable. A change of low magnitude to a sensitive receptor, resulting in a minor beneficial effect	Little change over time, so an ongoing minor beneficial effect

Type	Ref	Location	Distance	Current View Towards Proposals	Visual Effect in the Year of Opening (Winter)	Visual Effect 15 Years after Construction (Summer)
				traffic visible close to, Existing A90 traffic visible in the middle distance		
R	49	Mains of Newtyle	300m to new A975, 700m to new A90	Open very gently rolling landscape of intensive agriculture to the north, rising slightly to the west, views towards new road generally constrained by locally rising ground and farm buildings. Traffic on existing A90 visible to the west	Realigned A975 and junction with A90 would probably be just visible between and beyond buildings at Rashierieve, reduced traffic visible on the existing A90. Very low magnitude of change to a sensitive receptor, a minor beneficial effect	Little change over time, so an ongoing minor beneficial effect
R/T	50	Newtyle Croft, also the view for road users from the A975	700 m	Open view across generally flat fields with activity on the existing A90 in the background	Alignment of the A90 would change, but the overall view would be little altered. A change of very low magnitude to a highly sensitive receptor, giving an overall minor effect but neutral in character	No significant change over time. Ongoing minor and neutral effect
R	51	Blair Lodge	200 m	Short views west across fields falling very gently away to horizon in middle ground, ridge at Aikenshill forms background to southern part of view	Road unlikely to be visible from the house itself but high sided traffic would be seen from the side window. Garden summerhouse positioned to take advantage of views would have clear view of road across full view, on tapering embankment, although false cut would screen lower vehicles. A change of high magnitude to a highly sensitive receptor, a **major adverse** effect	Planting on the embankment would have matured, substantially screening traffic from view, although where gaps left to allow views to the sea, traffic would remain visible and intrusive above the horizon. The effect would reduce over time to **moderate adverse**
R	52	Kirkhill	200m	Dense planting around the house means that there is no view towards the road	No effect	No effect
R	53	Overhill	700 m	Broad open view across agricultural land falling away to distant coast. Existing road part of distant scene	New road would be visible in main outlook but further than existing, junction and embankments visible closer to in oblique views. A change of low magnitude for a highly sensitive receptor: minor adverse effect	Planting around the new junction would mature, reducing the visibility of traffic, although some adverse impact would remain: minor adverse effect

Type	Ref	Location	Distance	Current View Towards Proposals	Visual Effect in the Year of Opening (Winter)	Visual Effect 15 Years after Construction (Summer)
R/B	54	Blairythan Smithy	120m	House sits slightly below level of existing A90, which is directly alongside. Broad views across open flat fields, distant clumps of trees, distant sea. Views to south constrained by garden boundary planting	New A90 would be parallel to the existing, slightly further away and slightly lower. Reduction in traffic on the existing A90 would be a positive change of medium magnitude to a highly sensitive receptor and thus a **moderate beneficial** effect	Little change over time, so an ongoing **moderate beneficial** effect
R	55	Roadside Croft	120m	Broad views across open flat fields with distant clumps of trees to distant coast. Incised valley of Foveran Burn a feature in oblique views. Existing A90 in immediate foreground	New A90 would be parallel to the existing, slightly further away and slightly lower, with crossing of incised valley, cutting beyond, and side road overbridge clearly visible. Reduction in traffic on the existing A90. Some adverse and some beneficial effects. A change of medium magnitude to a highly sensitive receptor, on balance a minor adverse effect	Planting around the side road bridge would develop to screen some of the traffic on the new road, reducing the adverse effects such that on balance the effect would be minor beneficial
R	56	Foveran Village	100 m	Broad views across open flat fields with distant clumps of trees to distant coast. Incised valley of Foveran Burn a near feature. Existing A90 in immediate foreground	As 55, but on balance a minor beneficial effect	Planting around the side road bridge would develop to screen some of the traffic on the new road: ongoing minor beneficial effect
R/B	57	Ardgill	750 m	Open view across gently rolling fields to ridgeline at Aikenshill. Occasional clumps of trees. Existing A90 a busy feature in the middle-to back-ground	New road would cut across the view, slightly more prominent than the existing and the grade separated junction would be clearly visible in middle-ground. A change of medium magnitude for a highly sensitive receptor: **moderate adverse** effect	Planting around the junction would have matured, creating a new landscape feature and screening enough of the road and traffic to reduce the effect to minor adverse
R/B	58	'The Store' and adjacent house	600m	Similar to 52, but further from both existing and new roads	New road further away, in cut so road and traffic less visible. A positive change of low magnitude to a highly sensitive receptor: minor beneficial effect	Roadside and adjacent trees should mature to completely remove road from view, but as change overall small, remaining a minor beneficial effect
R	59	Westfield Cottage	400m	Open view across field to existing A90 and Old Mill, then new woodland and further fields to distant	New road further away, in cut so road and traffic less visible. A positive change of low magnitude to a highly sensitive receptor: minor beneficial effect	Roadside and adjacent trees should mature to completely remove road from view, increasing the positive effect, to a **moderate beneficial** effect

Type	Ref	Location	Distance	Current View Towards Proposals	Visual Effect in the Year of Opening (Winter)	Visual Effect 15 Years after Construction (Summer)
				woodland		
B	60	Foveran School	150 m	Broad views across open flat fields with distant clumps of trees to distant coast. Incised valley of Foveran Burn a near feature. Existing A90 in immediate foreground	New A90 would be parallel to the existing, slightly further away and slightly lower, with crossing of incised valley, cutting beyond, and side road overbridge clearly visible. Reduction in traffic on the existing A90. Some adverse and some beneficial effects. A change of medium magnitude to a moderately sensitive receptor, on balance a minor beneficial effect	Planting around the side road bridge would develop to screen some of the traffic on the new road: ongoing minor beneficial effect
R	61	Old Mill (adjacent houses)	200 – 300 m	View east direct onto busy road then across open fields to distant woodlands, newly planted woodland in immediate foreground	New road across the whole of the fore- to mid-ground in views west, part on slight embankment part slight cut but adverse nature of change more than offset by the substantially reduced traffic in the immediate foreground**.** Overall a change of medium magnitude for a group of highly sensitive receptors so a **moderate beneficial** effect	Trees at Old Mill Croft should have matured to the point where they substantially obscure views of the new road. Ongoing **moderate beneficial** effect
R	62	Old Mill (Old Mill Croft)	150 m	View east direct onto busy road immediately outside the front door. View west across open fields to distant woodlands, newly planted woodland in immediate foreground	New road across whole of view west in foreground, in 3- 4m cut. A highly sensitive receptor, with adverse change of medium magnitude to the rear offset by the positive and high magnitude change of substantially reduced traffic viewed from front door. Overall a minor beneficial effect	Trees in foreground should have matured to the point where they completely obscure views of the new road, reducing the adverse aspects of change and thus increasing the positive balance to a **moderate beneficial** effect
R	63	Mill of Foveran	150 - 250 m	Slightly rising, open fields. Existing road glimpsed obliquely	New side road in foreground, new A90 across the view in mid-ground, closer but lower than existing. A change of medium magnitude to a group of highly sensitive receptors, giving a **moderate adverse** effect	Planting around the side road bridge would develop to screen some of the traffic on the new road: reducing the effect to minor adverse
R	64	House E of Mill of Foveran	500m	Wide open view over gently rolling fields with distant woodlands, activity on existing road across part of background	New road across part of view, slightly closer but in slight cut. A change of medium magnitude to a highly sensitive receptor, giving a minor adverse effect	Clumps of trees would have grown up, slightly reducing view of road (and adding interest to view) but remaining a minor adverse effect

Type	Ref	Location	Distance	Current View Towards Proposals	Visual Effect in the Year of Opening (Winter)	Visual Effect 15 Years after Construction (Summer)
R	65	Old Peoples Home nr Foveran Ch.	800m	Open view across rolling fields with distant clumps of trees, minor road. Activity on existing A90 just visible	New road across part of view, slightly closer but in slight cut. Change of such low magnitude that no effect	No significant change over time No effect
R/B	66	Pitmillan Group of cottages and pig unit	250 – 550 m	Broad view across gently rolling fields to ridge at Fountainbleau. Existing A90 across whole of view	New road across whole of view, although mainly in cut, small embankments to access road over bridge. A low magnitude change for receptors of low and high sensitivity, a minor adverse effect	Planting would mature helping to integrate new structures into the landscape, reducing the effect to a negligible level. None
R	67	Hillhead of Kincraig	700 m	House well surrounded by young planting, existing road small part in any views	New road further away and lower, change just perceptible but magnitude so low that no real effect. None	Garden trees in foreground should have removed all remaining views. None
R	68	West Pitmillan	450 m	Direct and open view down drive and flat fields either side to distant low hill horizon with woodlands. Traffic on existing road across the end of the foreground	New road almost twice as far away as the existing, although vehicles would still be visible. A positive change of low magnitude to a highly sensitive receptor: minor beneficial effect	No real change over time, an ongoing minor beneficial effect
R	69	Fountainbleau	15m	Expansive view of flat dull landscape with existing A90 in immediate foreground	New road slightly further away and slightly lower level, but old road at front gate re-opened as B9000. A highly sensitive receptor subject to a change of low magnitude: minor adverse effect	Screen planting should mature to enclose farm and almost completely screen the view of the road, except where this has been left open at the householder's request. There would be an ongoing minor adverse effect primarily from the traffic on the realigned B9000
R	70	Hillview / South Farden	200 m	Open view across broad valley, farmland and Christmas tree plantations, occasional trees. Quiet B9000 in foreground, busy A90 across whole view in mid-ground	Online dualling of existing road, so negligible change to the view. No effect	No real change over time No effect

Type	Ref	Location	Distance	Current View Towards Proposals	Visual Effect in the Year of Opening (Winter)	Visual Effect 15 Years after Construction (Summer)
R	71	South Farden Croft	550 m	No view from the house because tree planting around the garden gives very strong local screening	No effect	No effect
R	72	Bridgend		Open view up gently rising fields to South Farden, B9000 across whole of view but seen only as hedge line and occasional traffic	Local access road would run directly up the view from the foreground to the mid-ground, at existing grade. A highly sensitive receptor subject to a change of medium magnitude: **moderate adverse** effect	Clumps of trees and roadside hedge would have matured, softening the view, and reducing the effect to minor adverse
R/0	73	Fornety This viewpoint is also representative of views from the track which is a potential recreational route from Newburgh to Tipperty	300 m	Open view across broad valley, Christmas tree plantations and rough ground fore- and mid-ground, ridge and farm at Fountainbleau background. Busy A90 across half of view at rear of mid-ground	Online dualling of existing road, creating a low magnitude of change to a view from a highly sensitive group of receptors.: **minor adverse effect** Moderate beneficial at night if lighting removed	Woodland planting at the junction would have matured sufficiently to be visible, improving the backdrop to the view slightly. Effect would remain minor adverse
R/B	74	Tipperty industrial estate, and house	500m	Trees and bunding in foreground, no real view of road	No effect	No effect
R	75	Tipperty north (half the village)	900+m	Distant view of bare open hill with activity on existing A90 visible through gaps in foreground trees	New road on existing alignment, extra width unlikely to be noticeable No effect	Copse around B9000 junction may start becoming visible above the horizon, but very distant so very low magnitude of change. No effect

12 ARCHAEOLOGY AND CULTURAL HERITAGE

12.1 INTRODUCTION

This chapter considers the likely effects of the proposals on archaeology and cultural heritage resources. Individual sites have been identified and the effect of the development on the resource assessed. The findings of the study are presented in this section and where appropriate, mitigation measures have been identified.

The study area is located between the villages of Balmedie and Tipperty, in Aberdeenshire and is sited in arable and pastoral farmland (see Figure 1.1). The proposed development would affect an area of some 150.18ha. The wider areas where link roads and junctions are proposed would also be affected.

Cultural heritage resources can include World Heritage Sites, Scheduled Ancient Monuments, other archaeological sites and features, Listed and other historic buildings, Conservation Areas and Historic Gardens and Designed Landscapes. Those of relevance to this project are:

- Scheduled Ancient Monuments (SAMs);
- Listed buildings;
- Other archaeological sites, including the built heritage.

12.1.1 Scheduled Ancient Monuments (SAMs)

NPPG5[157] and PAN42[158] set out government policy and advice on how sites of archaeological and cultural heritage importance should be addressed within the development planning system. Where development is likely to encroach on such sites, early discussions should be sought and an archaeological assessment and field evaluation undertaken where appropriate. The protection of SAMs and their setting is expressly noted as a material consideration in determining planning applications. Ultimately the responsibility for scheduling monuments and protecting SAMs lies with the Scottish Executive. The executive agency that has responsibility for archaeology and the historic environment in Scotland (including SAMs) is Historic Scotland[159]. SAMs are considered to be sites of national importance[160].

12.1.2 Listed Buildings and Other Sites with Statutory Protection

NPPG18[161] sets out the national framework of statutory designations for the protection of the historic environment, particularly Listed Buildings, Conservation Areas and other designations such as World Heritage Sites and Historic Gardens. It recognises the historic environment as an irreplaceable record of our heritage and seeks to prevent potential development impacts on these features. It also recognises the importance of survey and analysis in this policy area. As with SAMs the statutory responsibility for listing and protecting these buildings lies with Historic Scotland, acting on behalf of the Scottish Executive[162]. Listed

[157] Scottish Executive (1998) NPPG5 – Archaeology and Planning
[158] Scottish Office (1994) PAN42 – Archaeology – the Planning Process and Scheduled Monument Procedures
[159] Historic Scotland (2006) Scottish Historic Environment Policy 2 – Scheduling: protecting Scotland's nationally important monuments
[160] Scottish Executive (1998) NPPG5 – Archaeology and Planning
[161] Scottish Executive (1998) NPPG18 – Planning and the Historic Environment
[162] Scottish Executive (1998) NPPG18 – Planning and the Historic Environment

buildings fall into three categories that reflect the degree of interest in, and importance of, the building. The following descriptions of listed building categories is taken from Historic Scotland's *Guide to the Protection of Scotland's Historic Buildings*[163].

- **Category A**: Buildings of national or international importance, either architectural or historic, or fine little-altered examples of some particular period, style or building type.
- **Category B**: Buildings of regional or more than local importance, or major examples of some particular period, style or building type which may have been altered.
- **Category C (S)**: Buildings of local importance, lesser examples of any period, style, or building type, as originally constructed or moderately altered; and simple, traditional buildings which group well with others in Categories A and B or are part of a planned group such as an estate or an industrial complex.

12.1.3 Other Archaeological Sites, including the Built Heritage

The local planning authority curates archaeological sites and monuments without statutory protection. The Aberdeen and Aberdeenshire Structure Plan 2001-2016 (Policy 20) commits Aberdeenshire Council to seek to conserve and promote its built heritage as a valuable non-renewable resource (see Section 5.4). The Aberdeenshire Local Plan (2006) recognises that cultural heritage sites are a valuable resource (Policy ENV\17-20) (see Section 5.5). In general these policies would refuse development if it would result in an adverse impact on a cultural heritage site unless 'there are imperative reasons of overriding public interest' and 'there is no alternative site for the development' (Policy ENV\19&20). In general, sites without statutory protection can be considered of regional or local importance.

12.2 SOURCES OF INFORMATION

The sources of information listed below have been used for this assessment.

- Consultation with statutory and non-statutory bodies to identify sites of cultural heritage interest in proximity to the proposal including:
    - Historic Scotland (HS)
    - Aberdeenshire Council (AC): Planning and Environmental Services;
- A90: Balmedie to Tipperty Stage 2 Environmental Assessment. Turnbull Jeffrey Partnership and Carl Bro Group. December 1995;
- A90: Balmedie to Tipperty Stage 3 Environmental Assessment, Volume 2. Turnbull Jeffrey Partnership and Carl Bro Group. September 1996;
- National Monuments Record for Scotland (NMRS) at the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS);
- National Library of Scotland (NLS);
- National Archive of Scotland (NAS);
- Historic Scotland: Scheduled Ancient Monument and Listed Buildings data;
- Aberdeenshire Council's Archaeology Service, local Sites and Monuments Record (SMR); and
- Desk based work for the Stage 2 Addendum Report[164]

[163] Historic Scotland (2006) Guide to Protection of Scotland's Historic Buildings – what listing means to owners and occupiers
[164] Transport Scotland, 2006. A90 Balmedie to Tipperty, Stage 2 Addendum Report. Carl Bro. November 2006

- Findings of survey work undertaken in October 2006 and February 2007 including:
    - site visits; and
    - photographic record.

12.3 CONSULTATIONS

Key issues raised by consultees include:

- the potential impacts on Orrock House (A-listed) were considered more important than the potential impacts on the Menie Estate (B-listed) (Historic Scotland 2006);
- the gatehouse of Menie House is considered to be listed (Category B-listed) as it was built before 1948 and is therefore in the curtilage of the main house (Aberdeenshire Council, 2006); and
- in the vicinity of Orrock House the route is preferable to the one suggested in 1996 as there would not be a junction to the north of Balmedie.

12.4 BASELINE

12.4.1 Site Records

The baseline information has been collated from work for the original Stage 2 and 3 studies; further work for the Stage 2 addendum studies and specific work for the proposed route.

A corridor along the route of 300m either side of the proposed A90 (T) and around the junctions and link roads has been surveyed for non-statutory protected sites. All sites within this corridor that are recorded in the NMRS and SMR are identified in the gazetteer. A corridor for Listed Buildings and Scheduled Ancient Monuments of 1km either side has been surveyed to better give an impression of the effect the dual carriageway would have on these statutory protected sites. These sites have been plotted and are presented as Figures 12.1a-c.

During the site visit all of the Listed Buildings that had been identified during the Stage 2 assessment were visited. Hare Cairn SAM and Temples Stones SAM, were also visited, as it was likely to be impacted on by the new B977 link road. In addition to this the corridor of new A90(T) was also rapidly walked. This mainly served to confirm the data that had been obtained from the NMRS and SMR but also led to the recording of two additional minor sites.

In total 78 cultural heritage sites have been identified within the study area. The majority of these sites are of local importance and have no statutory protection. In addition, there are eight Listed Buildings within the study corridor, one of which is considered of National Importance (site 5), and a single SAM (site 1 (see above)). A full list of sites is presented as Appendix 12.3 and for a description of importance criteria see Table 12.1. Further information is available in the site gazetteer (see Appendix 12.1).

12.4.2 Historic Background of the Area

The historic background of the general area has been considered because the current baseline conditions of the study corridor are a reflection of its archaeological and historic development.

The Prehistoric Period

There is some evidence for prehistoric activity, and two SAMs of prehistoric date are present within the study corridor (sites 1 and 79). A Bronze Age burial at Keir has been noted (site 16), although no sign of it is now visible and there is no local knowledge of this site, and there is a Bronze Age Barrow at Bairnie Hillock (site 82). Within the study corridor, there are various cropmarks of possible prehistoric date and isolated findspots of prehistoric artefacts: a dolerite axe (site 14) and flint artefacts (sites 37 and 87). In the general environs (within c. 5km but outside the study area) there are a number of prehistoric SAMs. These include, but are not limited to Monykebbuck Standing Stone, Hill of Fiddes Stone Circle, South Ythsie Stone Circle, Hill of Logie Settlement, and Pitlurg Long Barrow[165]. There are also various non-statutory protected prehistoric sites outside the study corridor, such as Mesolithic flint working sites along the coast and a notable findspot of gold torcs[166]. The New Statistical Account of 1834-45 states that there had been a number of stone circles and prehistoric burial mounds upstanding in the parish of Belhelvie[167].

Clearly there is much evidence for prehistoric activity, particularly Neolithic and Bronze Age, in the wider area around the preferred route. This could indicate that there are other unidentified prehistoric sites, in the vicinity of the proposed development. The clay soils in the area are generally unresponsive to aerial archaeological survey and have yielded little in the way of cropmark information on prehistoric or medieval archaeological sites. This apparent lack of data, however, is not an indication that the potential archaeological resource is limited.

The Medieval Period

The southern part of the area is recorded in the early 14th Century as part of the lands of the Thanage[168] of Belhelvie, which included the lands of Belhelvie, Ardo and Menie. None of the centres of these estates lie within the study corridor, but it does include Overblairton (later known as Orrock). The Lands of Overblairton are cited in a charter of 1388 when they were granted to John Fraser of Forglen[169]. In 1616, the rights of John Wood of Fettercairn's to Over Blairton were confirmed by James VI. A charter of 1770 refers to a 'Manour Place'[170]. Many of the other more substantial farms are likely to have their origins in this period, even if the present buildings are of a later date. Some of the major land boundaries are likely to reflect these early land holdings.

Post Medieval and Early Modern

The Roy map[171] of 1747-55 shows the area largely comprising rig fields, indicating open field cultivation, and an enclosed area around Newtyle is prominent. A large part of the study corridor was part of the estates of the Earl of Panmure who forfeited his lands for his part in the Jacobite rebellion of 1715[172]. The estate was divided into different lots and sold in 1782. Under new owners, in the later 18th Century there was a period of agricultural improvement in this area[173] and it is likely that the present pattern of field boundaries was then formed, although they

[165] These SAMs are outwith the study corridor and are only mentioned to give an impression of prehistoric monuments in the general area. These SAMs would not be impacted on by the development.
[166] This site is outside the study area. The NMRS reference number is NJ92SE 5
[167] New Statistical Account. Volume 12, 244
[168] A than age is the land granted to a feudal lord or baron
[169] Grosjean, A & Murdoch, S (2001) Belhevie: A Millennium of History
[170] Aberdeenshire Council Archaeology Service SMR. (2006) SMR # NJ91NE0010
[171] SCRAN Roy Military Survey of Scotland Sheet 30/1f
[172] Old Statistical Account Volume 6, 64 The Statistical Account of Scotland, Foveran, County of Aberdeen
[173] Old Statistical Account Volume 6, 64 The Statistical Account of Scotland, Foveran, County of Aberdeen

would in some places incorporate earlier property divisions. Some farms are recorded as settlements from the 17th Century and may well have earlier origins. An example of 17th Century settlement is suggested by documentary evidence. Edward Adamson and his sons Edward and William are recorded in Kirkhill of Foveran in the mid to late 17th Century[174].

Cartographic Evidence and Landscape Development

The early cartographic evidence is limited. The earliest surviving map of the region, Pont's manuscript map of Deeside drawn in c1583-96 has no information on the study corridor.[175] Although the area is depicted on Gordon's manuscript map of c1636-52, it only shows as symbols the more prominent centres of Foveran, Menie and Blairton[176]. The first detailed cartographic source for the study area is Roy's *Military Survey of Scotland*[177], surveyed in 1747-55 but this is quite poor in its coverage. The agricultural improvements of the late 18th and early 19th centuries, discussed above, changed the face of the landscape with the introduction of the enclosed fields that give it its present character. Details for the area of Foveran are seen on an estate map of 1843[178] and for the whole study area with the 1st edition OS map[179].

Early Transport Networks

Many roads in the corridor were not primarily for through traffic but lead to local centres such as the parish church. Some of these survive today as minor roads, others as mere tracks. The line of the minor road (linking the B999 to the A90) which runs immediately to the north of Orrock House and the Mains of Orrock is likely to reflect an early estate boundary. There is the possibility of a boundary stone or similar marker at its angle where it is proposed that an overpass begins.

An older north/south road survives in use from Balmedie, running past Blairton, to Belhelvie Old Parish Church (see Photograph 8) and Menie House. It is probable that before the early 19th Century the main entry to the house of Blairton was from this minor road. An avenue extends west of the house to an entrance on the present A90 but it is possible that originally it extended further along the line of the field boundary to the west of the road. This is shown as a minor road on the OS 1st edition map[180].

The transport pattern was changed with the building of the Aberdeen to Ellon turnpike road along the line of the present A90, completed in 1799[181]. It cuts through an older network of roads and tracks connecting the settlements of the area. The turnpike road also cut through earlier estates and severs landscape features. Subsequent developments included the upgrading of the Rashiereive to Newburgh road, the present A975, planned in 1820[182].

The Changing Field Patterns

[174] NLS Inventory Dep. 327. 145, Fraser of Strichen and Lovat Papers

[175] National Library of Scotland (c1583-96) Pont Map 11. Lower Deeside

[176] Gordon, R (c1636-52) Manuscript map Aberdeen, *Banf [sic], Murrey [sic] &c. to Inverness : [and] Fra the north water to Ross* / Robertus Gordonius a Strathloch describebat 1640. National Library of Scotland Adv MS. 70.2.10

[177] SCRAN Roy Military Survey of Scotland Sheet 30/1f

[178] National Archives of Scotland RHP 42829 Plan of estate of Foveran, the property of Andrew Robertson, showing names of residents and acreages, 1843

[179] Ordnance Survey (1869-1870) First Edition Six Inch Mapping

[180] Ordnance Survey (1869-1870) First Edition Six Inch Mapping

[181] Day, T (2003) The Construction of Aberdeenshire's first turnpike roads, *J Transport History* (Sept 2003), 162.

[182] National Archives of Scotland RHP45412 Plan of road from Rashiereive to the Ellon to Peterhead turnpike at Auchiries and West Turnalief, 1820

The agricultural improvement of the later 18th Century resulted in initial prosperity from intensive farming. A survey carried out in the early 19th Century found that the Mains of Orrock was the heaviest stocked farm in all of Great Britain and Ireland[183]. Many of the larger farmhouses were substantial properties on sites documented in the 16th Century or earlier. These contrasted with smaller holdings, often held on a 10-year lease, said by Smith[184] to be 'of an inferior description, with thatched roofs'. There was a decline in agricultural fertility after c1880 and a subsequent amalgamation of some of the smallholdings into larger units[185]

There was a major rebuilding of farm properties associated with this agricultural improvement. A particular example is that of the former estates of Overblairton and Colpnay which were acquired by John Orrock who changed the name of the estate to that of Orrock and erected the present Orrock House in c 1780[186]. The large home farm (Mains of Orrock) reflects the increased production generated by this revolution in agriculture. The framework of the small associated designed landscape around Orrock House also dates from this time.

12.4.3 Identified Sites within the Study Corridor.

The archaeological and built heritage sites that have been identified within the study corridor are included in the sites gazetteer (in Appendix 12.1). Each site has been given a reference number that is unique to this report. The gazetteer includes a brief description of each site and any other relevant information, such as grid references and SMR and NMRS references where possible. It also identifies for which sites effects on setting have been taken into account.

12.4.4 Baseline Setting of SAMs and Listed Buildings

To assess the significance of potential effects of the proposals on the setting of the historic resource it is necessary to consider the baseline setting of the SAMs and Listed Buildings within the study corridor. The photographs which are referenced are included in Annex D.

Baseline Setting of Hare Cairn (SAM) (see Photograph 5)

Past Setting

- The monument was not isolated in the prehistoric landscape
    - Other monuments in wider area (e.g. Temple Stones, site 79)
    - Probably part of a wider ritual landscape
    - Artefactual and cropmark evidence of prehistoric settlement
    - Cist Burial at Keir
- A prominent feature in the landscape
- Visible from most of surrounding area
- Designed to be viewed rather than viewed from
- Temple Stones was intervisible with this monument

[183] Grosjean, A & Murdoch, S (2001) Belhelvie: A Millennium of History. 9
[184] Smith, A 1875 A New History of Aberdeenshire. 258
[185] Hamilton, H (ed) (1960) The Third Statistical Account of Scotland: the County of Aberdeen. 151.
[186] Aberdeenshire Council Archaeology Service SMR. (2006) SMR # NJ91NE0083.
[187] These SAMs are outwith the study corridor and are only mentioned to give an impression of prehistoric monuments in the general area. These SAMs would not be impacted on by the development

Present Setting
- Setting compromised by surrounding features
- Existing link roads and A90
- Telegraph poles and modern housing to the west
- Reservoir to east
- Set in pastoral farmland hence why it hasn't been ploughed out.
- No longer serves its original purpose but still a valuable cultural resource

Hare Cairn is a monument that has existed in the landscape for several millennia. Its setting has changed over time and no longer fully reflects its original setting. The monument's setting has been compromised by various modern developments in the vicinity.

Baseline Setting of Orrock House (Category A Listed) Gatepiers and Dovecot (Both Category B Listed) (see Photograph 10)

Historic Setting
Probably built on the site of an earlier estate centre
- Estate formerly Over Blairton
- Possible early estate boundaries survive
- Earlier road network links the surrounding settlements and the church
- Part of an undesignated 18th Century designed landscape, with ornamental gatepiers and dovecot
- The circular dovecot, with ogee arches[188], was evidently built to be considered from the house as a distant folly
- Mains of Orrock is part of the group setting

Present Setting
- Turnpike road constructed to the east
- Original access route to Belhelvie Old Parish Church was compromised, but not blocked
- Increased traffic flow
- Widened to become the present A90
- Surviving field patterns are associated with the 18th Century house

Orrock House and its associated features are clearly an important part of the historic landscape of this area. The house itself is considered of National Importance and is Category A Listed. While the associated Category B Listed structures are of lesser importance they should be considered an integral part of the setting.

Baseline Setting of Mill of Foveran (Category B Listed) (see Photograph 20)

Historic Setting
- 17th Century mill possibly supersedes an earlier mill at Old Mill
- Mill lade runs along the side of the road to Foveran
- The lade is an essential part of the historic industrial infrastructure of this building
- Associated buildings in the immediate area

[188] An ogee arch is formed by two s-shaped curves meeting at a point

Present Setting
- Mill now converted to a dwelling
- Present A90 runs 300m to the west

Mill of Foveran is a significant industrial building that has been converted into a dwelling.

Baseline Setting of Belhelvie Old Parish Church (Category B Listed)

Past Setting
- Original foundation of church on this site dated to 1157
- Building is T-shaped in form with a high west gable and bellcote dated 1762
- One of the morthouses is clearly old and pre-dates the latest one, which is dated 1835
- Predates the turnpike road (current A90)
- Earlier road network links the surrounding settlements and the church

Present Setting
- Church is now in a ruinous condition
- The construction of the early 19th Century turnpike road has compromised earlier road network
- The current A90 runs ca 130m to the west

Belhelvie Old Parish Church is an important part of the historic landscape. The surviving ruined building dates from the mid-18th Century but has been the site of a church since the mid-12th Century. The church site pre-dates the turnpike road (current A90) and was originally connected by an earlier road network.

Baseline Setting of Menie House and Lodge (Category B Listed)

Historic Setting
- Centre of a mediaeval estate
- L-shaped tower house built (1782-83)
- Menie House (built c1835) incorporates earlier tower house
- Lodge is contemporary with c1835 house
- Menie House sits the remains of an undesignated 17th-19th Century designed landscape

Present Setting
- Menie House is 930m from the current A90
- The 17th-19th Century designed landscape partially survives
- Large amounts of woodland were removed in the 1950s
- Menie House is still completely screened from the current A90
- The Lodge is adjacent to the current A90
- The Lodge forms the main entrance to the estate
- Present setting of the Lodge is compromised by heavy traffic flow

Menie House and its Lodge are clearly an important part of the historic landscape of this area. Menie House is considered of Regional Importance and is Category B Listed. Its lodge, while not explicitly listed, is considered to be within the curtilage of the listed building. Menie House is screened from the current A90 by its residual designed landscape. The Lodge is immediately adjacent to the A90.

Baseline Setting of Balmedie House and Lodge (Category C (S) Listed)

Historic Setting
- Gatepiers date from the 18th Century
- Balmedie House (1878) has incorporated a single story early 19th Century building
- Lodge is contemporary with the early 19th Century building
- House sits in the remains of an undesignated 17th-19th Century designed landscape

Present Setting
- Current A90 runs 500m to the west of Balmedie House
- The lodge and gatepiers are adjacent to the old turnpike road, the current A90 is ca 100m to the W
- The dualling of the current A90 has meant that the lodge and gate piers no longer sit next to the main road.

Balmedie House is screened from the current A90 by its residual designed landscape. The Lodge is next to the earlier road and is close to the existing A90 dual carriageway.

Baseline Setting of Temple Stones (SAM) (see Photograph 1)

Past Setting
- The monument was not isolated in the prehistoric landscape
    - Other monuments in wider area (e.g. Hare Cairn, site 1)
    - Probably part of a wider ritual landscape
    - Artefactual and cropmark evidence of prehistoric settlement
    - Barrow at Bairnie Hillock (site 82) c. 1km to east
- A prominent feature in the landscape
- Visible from most of surrounding area
- Designed to be both viewed and viewed from
- Hare Cairn was intervisible with monument

Present Setting
- The monument is currently in fairly poor condition and has been used as the location for a field clearance cairn.
- Set in a heavily ploughed field. Ploughing stops approximately 1m from the monument.
- Approximately 1km west of the existing A90
- No longer intervisible (at ground level) with Hare Cairn due to dry-stone field boundaries.
- No longer serves its original purpose but still a valuable cultural resource

The Temple Stones is a monument that has existed in the landscape for several millennia. Its setting has changed over time and no longer fully reflects its original setting. Ploughing has significantly compromised the monument's setting.

12.5 ASSESSMENT METHODOLOGY

The importance attributed to each archaeological site has been determined using the criteria outlined in Table 12.1, based on guidance provided in paragraph 17 of NPPG 5 Archaeology and Planning[189]. Adoption of these principles would help ensure the design affords appropriate importance to all archaeological features. For the purposes of this assessment, the sensitivity of a site to physical change is taken to be directly proportional to its importance.

Table 12.1: Definitions of Importance of Archaeological Sites

Level of importance	Criteria
National	Scheduled Ancient Monuments; Category A Listed Buildings; sites that are important within a national context
Regional	Category B Listed Buildings; sites that are important within a regional context
Local	Category C (S) Listed Buildings; other sites (e.g. findspots) sites that are important within a local context

12.5.1 Magnitude of Physical Impact

The magnitude of any adverse physical impact on a cultural heritage site resulting from the current development proposal, prior to final mitigation, was determined using the criteria in Table 12.2. Level of impact is defined as High, Medium, Low and Negligible.

Table 12.2: Definitions of Magnitude of Physical Impact

Level of Physical Impact	Criteria
High	Ground-breaking works would result in the loss of an area, features or evidence fundamental to the historic character and integrity of the site. Severance would result in the complete loss of physical integrity
Medium	Ground-breaking works would result in the loss of an important part of the site or some important features and evidence, but not areas or features fundamental to its historic character and integrity. Severance would affect the integrity of the site, but key physical relationships would not be lost
Low	Ground-breaking works or the severance of the site would not affect the main features of the site The historic integrity of the site would not be significantly affected
Negligible	Ground-breaking works or the severance of the site confined to a relatively small, peripheral and/or unimportant part of the site. The integrity of the site, or the quality of the surviving evidence would not be affected

12.5.2 Assessment of Physical Effect Significance

The significance of effects from the development proposals on individual archaeological and historic sites was determined by comparing the magnitude of the physical impact with the archaeological sensitivity of each site or monument. The level of significance can be defined as Major Adverse, Moderate Adverse, Minor Adverse, or No Effect (see Table 12.3).

[189] Scottish Executive (1998) NPPG5 – Archaeology and Planning.

Table 12.3: Determining the Significance of Physical Impact

	Sensitivity		
Magnitude	Local	Regional	National
High	Moderate Adverse	Major Adverse	Major Adverse
Medium	Minor Adverse	Moderate Adverse	Major Adverse
Low	Minor Adverse	Minor Adverse	Moderate Adverse
Negligible	No Effect	No Effect	No Effect

12.5.3 Assessment of Setting Effect Significance

Assessing the effect of the proposals on setting is much a more abstract activity than assessing physical impacts. The reason being that physical impacts are easier to quantify and predict, while an assessment of an effect on the setting of an archaeological or built heritage site is more subjective and requires a degree of professional judgement and a 'feel' for the site in question. Therefore, the assessment of the setting of these sites entails a description of the past and present setting (see Section 12.4.4) and a description of the future setting (impact of the scheme) (see Section 12.8). These have been presented as a series of bullet points for each site. For the purposes of this assessment the effects of the development on the setting of Listed Buildings and Scheduled Ancient Monuments has been considered. Also, in recognition of the impact that noise level change can have on an archaeological and built heritage site, noise level changes at these sites have been considered in Chapter 14 (see Sections 14.5.2 and 14.7). The results of this analysis are summarised, where relevant, in Section 12.8.

Table 12.4: Summary of Significance Definitions

Significance of Effect	Criteria
Major Adverse Effect	An adverse effect that alters cultural heritage resources fundamentally, such as the demolition of sites or buildings of National and Regional importance, a Category A and B Listed Buildings, or an archaeological site of equivalent standing (including, but not limited to Scheduled Ancient Monuments). Also the loss of integrity of a site of National importance
Moderate Adverse Effect	An adverse effect that alters cultural heritage resources materially but not fundamentally, such as the demolition of a site or building of local importance, such as a Category C (S) Listed Building or an archaeological site of equivalent standing. The loss of integrity of a site of archaeological interest of regional value, and/or a material change in the setting or visual amenity of a site of National importance, Category A Listed Buildings, SAMs etc
Minor Adverse Effect	A detectable adverse effect that does not alter the cultural heritage resources materially, such as a not detectable effect upon the setting or visual amenity of Listed Buildings and SAMs. Also the loss of physical integrity to a site of Local importance
No Effect	No detectable alteration to the cultural heritage resource
Minor Beneficial Effect	A detectable beneficial effect but which does not alter cultural heritage resources materially, such as a slight enhancement of the setting and amenity of a Listed Building or archaeological site

Significance of Effect	Criteria
Moderate Beneficial Effect	A beneficial effect that alters Cultural Heritage resources materially but not fundamentally
Major Beneficial Effect	A beneficial effect that alters cultural heritage resources fundamentally

12.6 POTENTIAL IMPACTS

The following is a summary of potential impacts that have been identified during the EIA process. Only sites that would be impacted on are mentioned below. A full list of sites and potential physical impacts is presented as Table 12.6. The table includes sites even if there is the potential for a negligible impact of no significance. The impacts on the setting of listed buildings and SAMs have also been considered and are presented below and in Table 12.5.

Potential Impacts resulting in the (Partial or Total) Physical Loss of a Site

- Physical impact on Drumhead cropmark (site 24) by the main route of the new A90(T). This would likely only result in the partial loss of any features as it is an extensive cropmark feature.
- Physical impact on a possible mill lade at Snarleshow (Dambrae) (site 42). The burn running alongside the property has been identified as a potential mill lade and would be partially destroyed by the new A90(T)
- Physical impact on Kirkhill upright stone (site 51) by new B-road link.
- Physical impact on one of the Overhill cattle rubbing stones (site 57) by junction layout.
- Physical impact on Pitgersie Bridge cropmark (site 62) by the main route of the new A90(T). This is a circular cropmark of unknown date and function. The new road would pass very close to the edge of the site.
- Physical impact on Mill of Foveran lade (site 72) by the main route of the new A90 (T). The new A90 (T) would partially destroy this feature.

Potential Impacts on Setting of SAMs and Listed Buildings

- Impact on the setting of Hare Cairn (site 1) by the new B977 link road and the main route of the new A90 (T)
- Impact on the setting of Balmedie House Lodge (site 2) and Balmedie House (site 3) by the main route of the new A90 (T)
- Impact on the setting of Orrock House and Gatepiers (site 5), and Orrock House Dovecot (site 4) by the main route of the new A90 (T) and the B-road re-routing
- Impact on the setting of Belhelvie Old Parish Church (site 6) by the main route of the new A90 (T)
- Impact on the setting of Menie House Lodge (site 8) and Menie House (site 7) by the main route of the new A90 (T)
- Impact on the setting of Mill of Foveran (site 9) by the main route of the new A90 (T) and B-road realignment at Foveran
- Impact on the setting of Temple Stones (site 79) by the Easter Hatton link

12.7 MITIGATION MEASURES

The previous section outlined the sites which could be directly affected by the A90(T) and those sites where it is considered relevant to appraise the effects of the proposals on setting. Committed measures which would be implemented to mitigate the impacts on the affected sites are presented below. Also a general

mitigation strategy for the discovery of previously unknown sites is set out. The landscape strategy for the scheme is described in Section 11.7.

General Mitigation for A90 (T), Junctions and Link Roads

CH1 A systematic intrusive survey would be undertaken by archaeologists for all areas affected by the proposals to identify undiscovered archaeological sites that could be affected by construction. This survey would be undertaken post-consent but prior to construction. Historic Scotland have suggested that 10% of the new land take should be trial trenched by machine. This trial trenching is in addition to the excavation of known sites that would be affected. The survey methods would be agreed with Historic Scotland and Aberdeenshire Council as part of a programme of works to be undertaken in advance of construction.

CH2 Geophysical survey would be used in areas identified as sensitive or deemed necessary by Historic Scotland and Aberdeenshire Council.

CH3 Any new sites, identified by intrusive trial trenching and/or geophysics, which would be affected by construction would be excavated and recorded as required by best practice.. The records would be lodged with the NMRS. A report of any discoveries would be completed to a suitable standard and copies submitted to the NMRS, the local SMR and Historic Scotland. A short account of the work and findings would also be submitted to Discovery and Excavation Scotland.

CH4 All known or discovered sites in proximity to the works would be fenced.

CH5 Any linear features affected by the works (e.g. stone walls) would reinstated to the edge of the works.

Mitigation of Physical Impacts on Known Sites

Physical impact on Drumhead Cropmark (site 24)

CH6 Drumhead cropmark would be trial trenched to determine the depth, extent and character of surviving archaeology if it cannot be avoided by the detailed design. If it is found that archaeological features could be disturbed then the site would be excavated and recorded to a suitable standard prior to construction.

Physical impact on mill lade at Snarleshow (Dambrae) (site 42)

CH7 The mill lade at Snarleshow, Dambrae would be recorded to a suitable standard by an archaeologist. The record would include a description and photographs.

Physical impact on Kirkhill Upright Stone (site 51)

CH8 The upright stone at Kirkhill would be recorded to a suitable standard by an archaeologist. The record would include a description and photographs. The stone would be relocated to the side of the re-routed road if necessary.

Physical impact on Overhill Cattle Rubbing Stone (site 57)

CH9 The upright stone at Overhill would be recorded to a suitable standard by an archaeologist. The record would include a description and photographs. The stone would be relocated to a suitable location nearby.

Physical impact on Pitgersie Bridge Cropmark (site 62)

CH10 Pitgersie Bridge cropmark would be trial trenched to determine the depth, extent and character of surviving archaeology if it cannot be avoided by the

detailed design. If it is found that archaeological features could be disturbed then the site would be excavated and recorded to a suitable standard prior to construction.

Physical impact on Mill of Foveran Lade (site 72)

CH11 The mill lade at Mill of Foveran would be recorded to a suitable standard by an archaeologist. The record would include a description and photographs.

Mitigation of Setting Impacts on Protected Sites

Setting impact on Hare Cairn (site 1)

CH12 The overall design strategy for the B977 link road has been to place the link road sympathetically in the existing landscape, following both the lie of the land and existing field patterns. The B977 would be bordered by a mixed hedge of native species with some trees to give the impression of a country lane. Other mitigating factors are that the site has already been compromised by modern features.

Setting impact on Orrock House (sites 4 and 5)

CH13 The overall design strategy for the A90(T) where it passes Orrock House has been to respect the open landscape setting of Orrock House. The visual intrusion of the A90(T) would be minimised by placing it as close to existing levels as possible and creating a naturalistic landform where it passes through the nearby ridgeline. The new road would be bordered with drystone walls of a similar character to the existing field boundaries in this area and some new planting.

Setting impact on Mill of Foveran (site 9)

CH14 Where the new A90(T) would pass Mill of Foveran, remnant fields would be planted in order to screen the road from the listed building. In addition the new A90(T) would be in a slight cutting at this point.

12.8 ASSESSMENT OF RESIDUAL EFFECTS

12.8.1 Permanent Effects

A full table of residual setting effects on SAMs and Listed Buildings is presented in Table 12.5 and a full table of potential physical effects on all sites is presented in Table 12.6. The significant effects of the preferred route are summarised below. The methodology for determining significance is outlined in Section 12.5. Where it is possible to suitably mitigate a physical or setting impact on an archaeological or historic site it is proposed that the significance of the impact may be reduced by one magnitude (see Table 12.4) to a minimum of a low magnitude impact. For example the *minimum* residual effect for sites of local and regional importance is *Minor Adverse*, while for sites of national importance it is *Moderate Adverse*.

Summary of Residual Physical Effects

- A minor adverse effect on Kirkhill Upright Stone (site 51).
- A minor adverse effect on Overhill Cattle Rubbing Stones (site 57).
- A minor adverse effect on Drumhead cropmark (site 24).
- A minor adverse effect on a possible mill lade at Snarleshow (Dambrae) (site 42).
- A minor adverse effect on Pitgersie Bridge Cropmark (site 62).

- A minor adverse effect on Mill of Foveran Lade (site 72).

Summary of Residual Effects on Setting
- A Moderate Adverse Effect on Hare Cairn (site 1).
- A Moderate Adverse Effect on the setting of Orrock House (site 5).
- A Minor Adverse Effect on Orrock House Dovecot (site 4).
- A Minor Adverse Effect on Mill of Foveran (site 9).
- A Minor Beneficial Effect on Belhelvie Old Parish Church (site 6).
- A Moderate Beneficial Effect on Menie House Lodge (site 8)

12.8.2 Detailed Assessment of Residual Effects on Setting

As mentioned in Section 12.5 the assessment of effects on setting is a more abstract task than assessing physical effects. As such, the specific effects on the setting of SAMs and Listed Buildings are presented here. These bullet points are intended to be read in conjunction with the baseline setting data that is presented in Section 12.4.4. The following sections set out the effects on setting (see also baseline data in Section 12.4.4).

Future Setting of Temple Stones (Scheduled Ancient Monument)
- The current A90 is already a dual carriageway where it passes c. 1km east of Temple Stones.
- Noise level changes for the south of the scheme have yet to be completed. However, it seems likely that the effect on Temple Stones will be negligible as it is approximately 1km west of the existing dual carriageway.

As the current A90 is already dualled where it passes this monument, and is c. 1km away there would be *No Effect* on the setting.

Future Setting of Hare Cairn (Scheduled Ancient Monument)
- New link road would run close to the site and would be visible
- Sense of remoteness decreases
- Noise level change of +1.2 db at this site would be negligible (see Chapter 14)
- Potential increased accessibility
- No longer accessed via A90 underpass at Keir Farm
- B977 link passes close by
- Potential for increased visitor numbers

The B977 would have a *Moderate Adverse Effect* on the setting of the monument but this is mitigated in part by the fact that the monument's setting is already compromised and the route has been placed sympathetically in the landscape. Also there is the potential for increased awareness of the monument as the new B977 could improve access for visitors.

Future Setting of Orrock House (Category A Listed) Gatepiers and Dovecot (Both Category B Listed)
- New A90(T) would run very close to the east of the house
- Increased noise levels due to traffic noise
- +6.6db noise level change at Orrock House would be of medium magnitude (see chapter 14)
- +3.4db noise level change at Orrock House Dovecot would be of low magnitude (see chapter 14)

- Intrusion of the A90(T) would reduce the visual amenity of the house
- Views from the house would also be adversely affected but this is mitigated in part due to the existence of the current A90 (single and dual carriageway) in the middle distance
- New A90(T) would further isolate the house from Belhelvie Old Parish Church
- The old road would be cut off and a new access route created.

There would be a *Moderate Adverse Effect* on the setting of Orrock House (site 5). There would also be a *Minor Adverse Effect* on Orrock House Dovecot (site 4). This is in line with the assessment of noise level change at the sites in question (see Chapter 14).

Future Setting of Mill of Foveran (Category B Listed)
- New A90(T) would run closer to the building
- Increased traffic noise of +2.5db would be considered negligible (see Chapter 14)
- Increased visual intrusion, mitigated in part by the new road being placed in a cutting
- The mill lade (site 72) would be cut through by the new A90(T)

The mill lade would be damaged by the new A90(T) and there would be increased visual intrusion by the new road. This would have a *Minor Adverse Effect* on the setting of the Mill of Foveran.

Future Setting of Belhelvie Old Parish Church (Category B Listed)
- The church relates to an earlier road network and is already compromised by the present A90
- As such the construction of the new A90 (T) would have a limited effect on the setting of the church
- The present A90 would still be partially visible from the church
- Decrease in traffic on present A90 may increase the amenity of the building
- There would be a decrease in traffic noise at the site (-6.7db) which is considered to be of moderate positive benefit (see Chapter 14)

As the church's setting is already compromised by the present A90 there would be little effect on the physical setting of the church by the new road. In terms of noise assessment a decrease in traffic noise would be of Moderate Beneficial Significance (see Chapter 14). In overall terms the effect on the setting of this site can be described as a *Moderate Beneficial Effect* as additional development in the area can be balanced against a positive noise level drop and a reduction in traffic close to the site.

Future Setting of Menie House and Lodge (Category B Listed)
- The preferred A90(T) route is further away from Menie House and Lodge
- Menie House remains screened from new road
- Decrease in traffic noise levels
- -1.1db at Menie House is of negligible magnitude (see Chapter 14).
- -12.6db at Menie House Lodge is of High magnitude (see Chapter 14).
- Current A90 remains as a local access road
- Lodge retains purpose as entrance to the Menie Estate although it is no longer beside the main N-S thoroughfare as originally intended.

The new A90 (T) would be situated further from both buildings than the current A90. Noise level change at Menie House is of no significance but at Menie House Lodge it is of Major Beneficial Significance (see Chapter 14). Taking into account the physical changes to the setting of the Lodge and the beneficial noise level changes, there would be a *Moderate Beneficial Effect* on the setting of the Lodge. There would be *No Effect* on the setting of Menie House as it remains screened within its residual designed landscape.

Future Setting of Balmedie House and Lodge (Category C (S) Listed)

- The current A90 is already a dual carriageway in the vicinity of Balmedie House and its Lodge
- Construction of the new A90 (T) would have limited affect on the setting
- There would be slightly increased noise levels
- +0.2db at Balmedie Lodge would have no impact (see Chapter 14).
- +1.3db at Balmedie House is of negligible magnitude (see Chapter 14).

As these buildings are already situated close to the existing part of the A90 dual carriage way there would be *No Effect* on the setting.

Table 12.5: Summary of Residual Setting Effects

No	Name	Potential Effects	Designation/ Importance	Significance of Residual Effect
1	Hare Cairn	B977 link road passes to the east	Scheduled Ancient Monument. National importance	Moderate adverse effect on setting of monument
2	Balmedie House Lodge	None	Category C (S) Listed. Local importance	None
3	Balmedie House	None	Category C (S) Listed. Local importance	None
4	Orrock House, Dovecot	Road closer to site	Category B Listed. Regional importance	Minor adverse effect on the setting of the building.
5	Orrock House and Gatepiers	Road closer to property, adverse effect on setting and views	Category A Listed. National importance (gatepiers Category B Listed)	Moderate adverse effect on setting
6	Belhelvie Old Parish Church	Road further west. Setting/amenity enhanced.	Category B Listed. National importance	Minor beneficial effect
7	Menie House	Road further west.	Category B Listed. Regional importance	None
8	Menie House Lodge	Road further west. Setting/amenity enhanced. Existing A90 remains as local access road so Lodge/gate retain purpose.	Category B Listed. Regional importance	Moderate beneficial effect
9	Mill of Foveran	Road closer to property but in a cutting.	Category B Listed. Regional Importance	Minor adverse effect
79	Temple Stones	None	Scheduled Ancient Monument. National importance	None

Table 12.6: Summary of Residual Physical Effects

No	Name	Potential Effects	Importance	Magnitude of impact	Significance of Residual Effect
1	Hare Cairn	No physical impact predicted	National importance	Negligible	No effect
2	Balmedie House Lodge	No physical impact predicted	Local importance	Negligible	No effect

No	Name	Potential Effects	Importance	Magnitude of impact	Significance of Residual Effect
3	Balmedie House	No physical impact predicted	Local importance	Negligible	No effect
4	Orrock House, Dovecot	No physical impact predicted	Regional importance	Negligible	No effect
5	Orrock House and Gatepiers	No physical impact predicted	National importance.	Negligible	No effect
6	Belhelvie Old Parish Church	No physical impact predicted	Regional importance	Negligible	No effect
7	Menie House	No physical impact predicted	Regional importance	Negligible	No effect
8	Menie House Lodge	No physical impact predicted	Regional importance	Negligible	No effect
9	Mill of Foveran	No physical impact predicted	Regional importance	Negligible	No effect
10	Mains of Newtyle	No physical impact predicted	Local importance	Negligible	No effect.
11	Southfolds Farm	No physical impact predicted	Local importance	Negligible	No effect
12	Southfolds	Link road upgrade passes very close to west of site but no physical impact is predicted.	Local importance	Negligible	No effect
13	Eggie	No physical impact predicted	Local importance	Negligible	No effect
14	Grey Gables	No physical impact predicted.	Findspot of a dolerite axe	Negligible	No effect
15	Keir Quarry	No physical impact predicted	Local importance	Negligible	No effect
16	Keir cist burial	No physical impact predicted but site may be indicative of other remains in the area.	Regional importance	Negligible	No effect
17	Keir	No physical impact predicted.	Local importance	Negligible	No effect

No	Name	Potential Effects	Importance	Magnitude of impact	Significance of Residual Effect
18	Dykenook (near Drumhead)	No physical impact predicted.	Local importance	Negligible	No effect
19	Drumhead Cottage	No physical impact predicted.	Local importance	Negligible	No effect
20	Drumhead Lodge	No physical impact predicted	Local importance	Negligible	No effect
21	Belhelvie North Church	No physical impact predicted	Local importance	Negligible	No effect
22	Belhelvie War Memorial	No physical impact predicted	Local importance	Negligible	No effect
23	Drumhead	No physical impact predicted	Local importance	Negligible	No effect
24	Drumhead cropmark	New A90 (T) would directly impact archaeological features	Local importance	Medium	Minor adverse effect
25	Blairton Cottage	Site lies below, or has been destroyed by existing A90. New A90 (T) passes slightly to the west at this point so no further Physical impact predicted	Local importance	Negligible	No effect
26	South Orrock	No physical impact predicted.	Local importance	Negligible	No effect
27	South Orrock Croft	No physical impact predicted.	Local importance	Negligible	No effect
28	Blairton milestone	No physical impact predicted	Local importance	Negligible	No effect
29	Blairton (Cock and Bull)	No physical impact predicted	Local importance	Negligible	No effect
30	Sidney Cottage	No physical impact predicted	Local importance	Negligible	No effect.
31	Sidney Cottage sand and gravel workings	No physical impact predicted	Local importance	Negligible	No effect
32	Mains of Orrock	No physical impact predicted	Local importance	Negligible	No effect

No	Name	Potential Effects	Importance	Magnitude of impact	Significance of Residual Effect
33	Mains of Orrock Sump	No physical impact predicted	Local importance	Negligible	No effect
34	St Colm's Well	No physical impact predicted	Local importance	Negligible	No effect
35	Pettens Croft	No physical impact predicted	Local importance	Negligible	No effect
36	Pettens	No physical impact predicted	Local importance	Negligible	No effect.
37	Menie arrowhead	No physical impact predicted	Imprecise findspot	Negligible	No effect
38	Boghead	No physical impact predicted	Local importance	Negligible	No effect
39	Cross-Stone	No physical impact predicted	Local importance	Negligible	No effect
40	Hill of Menie	No physical impact predicted	Local importance	Negligible	No effect
41	Hardhead (Wardhead)	No physical impact predicted	Local importance	Negligible	No effect
42	Snarleshow (Dambrae)	Road passes to west of property. Possible mill lade would be cut by the new road	Local importance	Low	Minor adverse effect
43	Cowhill	No physical impact predicted	Local importance	Negligible	No effect
44	Stoneyards	No physical impact predicted	Local importance	Negligible	No effect
45	Stoneyards	No physical impact predicted	Local importance	Negligible	No effect
46	Aikenshill Cottages	No physical impact predicted	Local importance	Negligible	No effect
47	Aikenshill	No physical impact predicted.	Local importance	Negligible	No effect
48	Kirkhill Cottage	New A90 (T) passes very close to west of site but no physical	Local	Negligible	No effect

No	Name	Potential Effects	Importance	Magnitude of impact	Significance of Residual Effect
		impact to buried archaeology is predicted	importance		
49	Newtyle Cottage	No physical impact predicted	Local importance	Negligible	No effect
50	Kirkhill	No physical impact predicted	Local importance	Negligible	No effect.
51	Kirkhill Upright Stone	New B-road link Kirkhill would directly impact on the stone	Local importance	High	Minor adverse effect
52	Rashiereive	No physical impact predicted	Local importance	Negligible	No effect
53	Rashiereive	No physical impact predicted	Local importance	Negligible	No effect
56	Foveran Free Church	No physical impact predicted.	Local importance	Negligible	No effect
55	Kirkhill	No physical impact predicted	Local importance	Negligible	No effect
56	Cairneylaw	No physical impact predicted.	Local importance	Negligible	No effect
57	Overhill Cattle Rubbing Stones	Junction at Kirkhill would involve the relocation of one of the stones (NJ 9678 2284)	Local importance	High	Minor adverse effect
58	Newtyle Croft	No physical impact predicted	Local importance	Negligible	No effect
59	Blairythan Smithy	No physical impact predicted	Local importance	Negligible	No effect.
60	Upper Pitgersie	No physical impact predicted	Local importance.	Negligible	No effect
61	Upper Pitgersie milestone	No physical impact predicted	Local importance	Negligible	No effect
62	Pitgersie Bridge cropmark	Road passes immediately to the east of the cropmark. Likely to have a partial direct impact on the site.	Local importance	Medium	Minor adverse effect
63	Oldmill	No physical impact predicted	Local importance	Negligible	No effect

No	Name	Potential Effects	Importance	Magnitude of impact	Significance of Residual Effect
64	Kingston	No physical impact predicted.	Local importance	Negligible	No effect
65	Pitmillan	No physical impact predicted	Local importance	Negligible	No effect
66	Fountainbleau	No physical impact predicted.	Local importance	Negligible	No effect
67	Fountainbleau cropmark	No physical impact predicted	Regional importance	Negligible	No effect
68	South Farden	No physical impact predicted.	Local importance	Negligible	No effect
69	South Farden demolished cottage	No physical impact predicted	Local importance	Negligible	No effect
70	Bridgend	No physical impact predicted	Local importance	Negligible	No effect
71	Tipperty Brickworks	No physical impact predicted	Local importance	Negligible	No effect
72	Mill of Foveran Lade	New road would cut the lade	Local importance	Low	Minor adverse effect
73	Blairythan windpump	No physical impact predicted	Local importance	Negligible	No effect
74	Menie Smithy	No physical impact predicted	Local importance	Negligible	No effect
75	Delfrigs	No physical impact predicted	Local importance	Negligible	No effect
76	Delfrigs	No physical impact predicted	Local importance	Negligible	No effect
77	Glengerrach	No physical impact predicted	Local importance	Negligible	No effect
78	Menie Milestone	No physical impact predicted	Local importance	Negligible	No effect
79	Temple Stones	No physical impact predicted	National	Negligible	No effect

No	Name	Potential Effects	Importance	Magnitude of impact	Significance of Residual Effect
			importance		
80	Hatton Farmstead	No physical impact predicted	Local importance	Negligible	No effect
81	Hatton Farmhouse	No physical impact predicted	Local importance	Negligible	No effect
82	Bairnie Hillock	No physical impact predicted	Local importance	Negligible	No effect
83	Hatton of Millden	No physical impact predicted	Local importance	Negligible	No effect
84	Millden	No physical impact predicted	Local importance	Negligible	No effect
85	Wester Hatton Cottages Cropmark	No physical impact predicted	Local importance	Negligible	No effect
86	Wester Hatton Cottages	No physical impact predicted	Local importance	Negligible	No effect
87	Wester Hatton Quarry	No physical impact predicted	Local importance	Negligible	No effect
88	Fife	No physical impact predicted	Local importance	Negligible	No effect
89	Wester Hatton Cropmark	No physical impact predicted	Local importance	Negligible	No effect
90	Wester Hatton Farmstead	No physical impact predicted	Local importance	Negligible	No effect

12.9 SUMMARY

- There are 90 sites, of which ten have statutory protection, of archaeological or historic interest in the study corridor.
- These include two SAMs and eight listed buildings.
- A review of the historical background of the area shows that the area has undergone substantial pre-historic and historic development. This would indicate that there is the possibility for further unidentified archaeology in the area.
- The A90(T) would have a direct physical impact on six sites of local importance. Only two of the sites in question would be destroyed. In the remaining four sites it is likely that there would only be partial loss of the site.
- The setting impacts of the ten sites with statutory protection have been considered. There would be moderate adverse effects on the settings of Hare Cairn SAM and Orrock House and Gatepiers and minor adverse effects on Orrock House Dovecot and the Mill of Foveran. There would be no effect on Balmedie House Lodge, Balmedie House, Menie House and Temple Stones, a minor beneficial effect on Belhelvie Old Parish Church and a moderate beneficial effect on Menie House Lodge.
- Where it has not been possible to avoid a physical impact on a site, the site would be revealed/excavated to determine whether there would actually be an impact by the route. If the archaeology was unavoidable then it would be excavated and recorded to a suitable standard. Where the site is upstanding, rather than buried archaeology, it would be recorded to a suitable standard.
- The two sites that would be destroyed are upright stones and would be relocated to a similar location nearby rather than being entirely removed.
- Any impacts on unidentified archaeology along the route would be mitigated by intrusive survey (possibly also geophysical survey), excavated and recorded to a suitable standard.

A summary table listing the effects of the scheme on archaeology and cultural heritage is in Appendix 12.3.

APPENDIX 12.1

GAZETTEER OF ARCHAEOLOGICAL AND HISTORIC SITES AND MONUMENTS

The gazetteer has been compiled using information held primarily at the National Monuments Record for Scotland (NMRS) and the Aberdeenshire Council Archaeology Service Sites and Monuments Record (SMR). All information relating to Listed Buildings and Scheduled Ancient Monuments derives from Historic Scotland (HS) the statutory agency responsible for managing sites and monuments protected by law.

Format

The format of each site entry in the gazetteer is in the order given (entries follow the NMRS or SMR where applicable)

Unique site number
Name
Site type
NMRS number
SMR number
National grid reference
Statutory Designation
Description of archaeological and historic interest taken from NMRS (RCAHMS 2006) or Aberdeenshire Council SMR (AC 2006) when possible.

Site No: 1
Site name: Hare Cairn
Site type: Cairn
NMRS number: NJ91NE 2
SMR number: NJ91NE0002
Map reference: NJ 9552 1765
Statutory Designation: Scheduled Ancient Monument
Description: Cairn; has a flat top with exposed stones. In the NW segment there is a berm 2m wide which may have encircled the cairn; old disturbance in base of cairn in the N (hole put in from level of berm with soil deposited on berm). A modern dyke encircles the cairn. An EBA food vessel fragments were found but exact location in cairn unknown.
(AC 2006)

Site No: 2
Site name: Balmedie Lodge
Site type: Residential; Gate Piers
NMRS number: NJ91NE 47.01
SMR number: NJ91NE0087
Map reference: NJ 9643 1814
Statutory Designation: Category C (S) Listed
Description: Lodge, c.1820-40, harled with eaves, behind 18th-century gatepiers with ringed ovoid finials.
(RCAHMS 2006)

Site No: 3
Site name: Balmedie House
Site type: Residential, Designed landscape
NMRS number: NJ91NE 47.00
SMR number: NJ91NE0056, NJ91NE0078
Map reference: NJ 9684 1829
Statutory Designation: Category C (S) Listed
Description: Mansion House, now in use as a retirement home. Built in 1878, for William Harry Lumsden, possibly to the designs of Peddie & Kinnear. Jacobean Baronial in style, rather pedestrian. It incorporates a single storey Regency house. The house is of two storeys with basement. It is constructed of local rubble with sandstone dressings. The tower is of four storeys, asymmetrical with a singular porch.
Set within the remains of a 17th to 19th century designed landscape.
(AC 2006)

Site No: 4
Site name: Orrock House, Dovecot
Site type: Dovecot
NMRS number: NJ91NE 12.03
SMR number: NJ91NE0013
Map reference: NJ 9598 1933
Statutory Designation: Category B Listed
Description: Circular doocot, c.1782, with ogee-arched doorway, cherry-cocking and high ratcourse.
(RCAHMS 2006)
18th Century; circular, rubble-built with rat course; some brick nesting boxes.
(AC 2006)

Site No: 5
Site name: Orrock House and Gatepiers
Site type: Residential; Gate Piers; Designed Landscape
NMRS number: NJ91NE 12.00; NJ91NE 12.02
SMR number: NJ91NE0010; NJ91NE0083
Map reference: NJ 9640 1956; NJ 9637 1960
Statutory Designation: Category A Listed (gatepiers Category B Listed)
Description: Site of manor/ mansion house; a three-storey gabled main block with single-storey piend roofed wings of same depth; S front dressed granite; tripartite doorpiece with semi-elliptical traceried fanlight. A family called Mitchell had acquired the tenure from Panmure in 1708 & a charter of 1770 refers to -a Manour Place-. AGR Mackenzie believed the present house to be an older house remodelled. The property was acquired by John Orrock from Alexander Fordyce in 1780-1.
Remains of an eighteenth to nineteenth century designed landscape. The grounds of the house are designed so that the aspect is open to the south, the remainder being planted with Ash, which are too close to the walls. To the south of the house is the site of the former tennis court and tennis house. The Mains to the north, the doocot and one acre of boggy woodland to the south-east also belong to the policies. The entrance at the north retains the gate piers. The driveway contains the probable remains of a pond with fountain in the centre of a small lawn. The wall on the north is rubble-built and 4' high, the wall to the east is a dry-stone dyke.
(AC 2006)

Site No: 6
Site name: Belhelvie Old Parish Church
Site type: Church; churchyard
NMRS number: NJ91NE 1.00; NJ91NE 1.01; NJ91NE 1.02
SMR number: NJ91NE0001
Map reference: NJ 9691 1964; NJ 9694 1963; NJ 9692 1961
Statutory Designation: Category B Listed
Description: The Church of Belhelvie was dedicated to St Neachtan, but at a later date St Columba was made the patron. The church was confirmed to the Bishop of Aberdeen in 1157, along with authority to erect his chapter. By 1256 the church had been erected into a prebend of the cathedral of Aberdeen, with the parochial duties being discharged by a vicar pensioner. The church is now ruined but was a T-plan church, represented by high W gable with bellcote (dated 1762) and part of S aisle (containing fine but weathered monument to Innes of Blairton). The east wall of the church is probably part of the wall of a Roman Catholic Church. The cemetery is unusual in having two morthouses, one dated 1835. The water stoup from the medieval church was in the garden of Belhelvie Manse but there is now no trace of it.
The bell which was in the bellcote was inscribed 'Henrick-ter-Horst-Me-Fecit-Daventriae-1633' and was stolen in 1966. There is a tombstone of 1722 in the angle of the masonry fragment of the S transept, and also a heraldic tomb on the other side of the wall. (AC 2006)

Site No: 7
Site name: Menie House
Site type: Residential; Designed Landscape
NMRS number: NJ92SE 17.00
SMR number: NJ92SE0013; NJ92SE0086; NJ92SE0118
Map reference: NJ 9776 2048
Statutory Designation: Category B Listed
Description: Possible site of manor.
Mansion House. Built c.1835 to the designs of John Smith. A Scots Elizabethan fantasy of two storeys with dormer heads. Built of pinned granite with freestone dressings and diagonally set chimney shafts. The south-west front is symmetrical, with central bay with curvilinear gable flanked by octagonal angles with sharp finials. The north-west front has a Tudor porch and circular angle tower. The earlier L-plan towerhouse, of two storeys, built 1782-3, is incorporated at the south-east.
Remains of a 17th to 19th century designed landscape. The remaining policies, around 125 acres, are nearly all parkland as the estate was bought for its timber in the 1950s and a sawmill and stackyard were built to the north of the walled garden. Shelter belts, a strip of deciduous woodland and some small copses survive. No specimen trees remain. The former drive is being replaced by a new one to its north. There are various ponds constructed from the field drains, with the remains of a bridge. The walled garden has a six-foot high rubble wall with round coping to the east and a lower north wall. The higher wall is possibly for protection from the salt winds coming from the sea.
(AC 2006)

Site No: 8
Site name: Menie Lodge
Site type: Residential; Gate Piers
NMRS number: NJ92SE 17.02
SMR number: NJ92SE0029
Map reference: NJ 9691 2067
Statutory Designation: Category B Listed (within curtilage of Menie House).
Description: Lodge building still in use.
(AC 2006)

Site No: 9
Site name: Mill of Foveran
Site type: Residential; Watermill
NMRS number: NJ92SE 10.01, NJ92SE 10.00
SMR number: NJ92SE0008
Map reference: NJ 9760 2398
Statutory Designation: Category B Listed
Description: The mill had an 18th Century datestone, now detached; mill has been raised in height but is now gutted workings. The reconstruction was probably the work of Massie of Aberdeen in the early 19th Century. The farmhouse is early 17th Century, dated at the NW skew, former girnal; single-storey basement & attic; rubble, chamfered openings with sandstone dressings partly replaced in cement; originals formerly barred; straight skews, St Andrews crosses in sunk relief at skewputts. Remodelled mid-19th Century; consoled cornice at attic floor level inserted; E front made symmetrical & steps added.
(AC 2006)

Site No: 10
Site name: Mains of Newtyle
Site type: Farmstead; Garden
NMRS number: N/A
SMR number: NJ92SE0090
Map reference: NJ 976 224
Statutory Designation: N/A

Description: Farmstead still in use that is depicted on the 1867 1st edition OS map. The map shows a T-shaped steading, two rectangular buildings and a rectangular garden. A large enclosure lies on the north side. A possible lade runs from the west to the farmstead and down its west side though no obvious mill exists. By the 1888 2nd edition map the farmstead layout now consists of an L-shaped building and three rectangular buildings.
(AC 2006)

Site No: 11
Site name: Southfolds Farm
Site type: Farmstead
NMRS number: NJ91NE 73
SMR number: N/A
Map reference: NJ 9623 1695
Statutory Designation: N/A
Description: Farmstead. Still in use. Shown of 1867 1st edition OS map.
(Kirkdale 2006)

Site No: 12
Site name: Southfolds
Site type: Residential
NMRS number: NJ91NE 72
SMR number: N/A
Map reference: NJ 9641 1714
Statutory Designation: N/A
Description: Nothing is now visible of this cottage, which stood in an area that has recently been redeveloped. The cottage is first depicted on the 2nd edition of the OS 6-inch map (Aberdeenshire 1901, sheet lvi.SE). Visited by RCAHMS (JRS, RJCM), 4 March 1999.
(RCAHMS 2006)

Site No: 13
Site name: Eggie
Site type: Farmstead
NMRS number: NJ91NE 70
SMR number: N/A
Map reference: NJ 9670 1726
Statutory Designation: N/A
Description: Except for what is probably a late-19th Century farmhouse, which is still occupied, the site of this farmsteading is now occupied by a library. As depicted on the 1st edition of the OS 6-inch map (Aberdeenshire, 1869, sheet lvi), the ranges of the steading were disposed around three sides of a yard. There was a horse-engine attached to the SW side near the S corner, and a small outhouse stood close to the NE end of the SE side. By the end of the 19th century there had been considerable change (1901, sheet lvi.SE). Most of the yard had been covered over, leaving only a small area open at the NE end, the horse-engine had been removed, and the outhouse had been linked to the adjacent range. By this time the farmhouse had been erected about 40m the SW, while to the E there were two additional ranges aligned NW and SE. Visited by RCAHMS (JRS), 13 August 2002.
(RCAHMS 2006)

Site No: 14
Site name: Grey Gables
Site type: Findspot
NMRS number: NJ91NE 17
SMR number: NJ91NE0017
Map reference: NJ 9639 1763
Statutory Designation: N/A

Description: An axe of dolerite with a sharp blade and pointed butt, measuring 27cm in length by 9cm width, was found in the garden of Grey Gables, Balmedie. In the possession of the finder, Mrs P Taylor, Grey Gables. NMRS, MS/712/6.
The location of the house called Grey Gables is NJ 9639 1763; on the date of visit no one was home, and it could not be established whether the stone axe found in its garden is still in possession of the owner. Visited by RCAHMS (JRS, RJCM), 4 March 1999.
(RCAHMS 2006)

Site No: 15
Site name: Keir
Site type: Quarry
NMRS number: NJ91NE 39
SMR number: NJ91NE0048
Map reference: NJ 9559 1769
Statutory Designation: N/A
Description: This relatively shallow quarry is first depicted on the 2nd edition of the OS 6-inch map (Aberdeenshire, 1901, sheet lvi.SE). It is situated about 50m ENE of the Hare Cairn (NJ91NE 2) and is now almost completely full of field-cleared stones. Visited by RCAHMS (JRS, IF) 1 April 1996.
(RCAHMS 2006)

Site No: 16
Site name: Keir
Site type: Cist; findspot
NMRS number: NJ91NE 3
SMR number: NJ91NE0003
Map reference: NJ 961 177
Statutory Designation: N/A
Description: A cist containing three Ca beakers and the body of a young adult female was found on the farm of Keir, Belhelvie, in 1915. The beakers are in the Museum of the Marischal College, Aberdeen, under accession No. 5. W D Simpson 1943; M E C Mitchell 1934. The farmer at Keir knew nothing of the cist. The owner of the farm in 1915 is now dead. Visited by OS (NKB) 23 March 1964. The findspot of this Beaker grave is not known; all of the fields belonging to the farm are arable and as such are potential locations for cist burials. (The location cited is that of the steading). Visited by RCAHMS (JRS, IF), 1 April 1996. Two of the Beakers are classified N4 and the other N3/L. NMRS, MS/712/85. The finds from these cists are in Marischal Museum, Aberdeen. The accession numbers of the three beakers are ABDUA: 19734-6. The human remains are ABDUA: 14226. Information from RCAHMS (JRS) 30 May 2001.
(RCAHMS 2006)
The current landowner has no knowledge of this site. Visited by Kirkdale Archaeology (AM, TW) 27 October 2006.
(Kirkdale 2006)

Site No: 17
Site name: Keir
Site type: Farmstead
NMRS number: NJ91NE 40
SMR number: NJ91NE0049
Map reference: NJ 9613 1770
Statutory Designation: N/A
Description: Farmstead still in use. On the 1st edition OS map it is shown as a shallow C-shaped steading with horse-mill attached to the north and an enclosure at the south-east. A small building lies to the south, and further south is the farmhouse within its garden. By the 2nd edition OS map the horse-mill, the enclosure and the small building have been removed. Two disused buildings are shown to the east of the steading. The 2005 map shows that the steading and farmhouse are still in use and have been modified.
(AC 2006)

Site No: **18**
Site name: **Dykenook**
Site type: Farmstead
NMRS number: NJ91NE 59
SMR number: NJ91NE0088
Map reference: NJ 9609 1817
Statutory Designation: N/A
Description: A farmstead, comprising two roofed buildings, one unroofed building and two enclosures is depicted on the 1st edition of the OS 6-inch map (Aberdeenshire 1870, sheet lvi), but it is not shown on the current edition of the OS 1:10000 map (1990). Information from RCAHMS (AKK) 31 March 1999.
(RCAHMS 2006)

Site No: **19**
Site name: **Drumhead Cottage**
Site type: Residential
NMRS number: NJ91NE 53.01
SMR number: NJ91NE0062
Map reference: NJ 9608 1839
Statutory Designation: N/A
Description: Cottage. Still in use.
(AC 2006)

Site No: **20**
Site name: **Drumhead Lodge**
Site type: Residential
NMRS number: NJ91NE 53.02
SMR number: NJ91NE0064
Map reference: NJ 9624 1845
Statutory Designation: N/A
Description: Lodge still in use.
(AC 2006)

Site No: **21**
Site name: **Belhelvie North Church**
Site type: Church
NMRS number: NJ91NE 48
SMR number: NJ91NE0057
Map reference: NJ 9565 1849
Statutory Designation: N/A
Description: Parish church; still in use.
(AC 2006)

Site No: **22**
Site name: **Belhelvie War Memorial**
Site type: Graves; War memorial
NMRS number: N/A
SMR number: NJ91NE0075
Map reference: NJ 956 185
Statutory Designation: N/A
Description: The Belhelvie war memorial stands in the grounds of the parish church, southeast of the church. It commemorates the dead of both World War I & II. It is a tall celtic cross, with interlacing, surmounting an angled base with lettering on the front and back. It stands on a one step plinth of rough dressed granite. It was erected on May 22nd 1921. There are a number of war graves in the cemetery as well. (AC 2006)

Site No: 23
Site name: Drumhead
Site type: Farmstead
NMRS number: NJ91NE 53.00
SMR number: NJ91NE0063
Map reference: NJ 9575 1855
Statutory Designation: N/A
Description: Farmstead still in use.
(AC 2006)

Site No: 24
Site name: Drumhead cropmark
Site type: Cropmark
NMRS number: N/A
SMR number: NJ91NE0090
Map reference: NJ 9634 1858
Statutory Designation: N/A
Description: Faint cropmarks of a possible circular feature and rig & furrow are visible on vertical aerial photographs taken in 1976 and 1988.
(AC 2006)

Site No: 25
Site name: Blairton, Cottage / South Orrock
Site type: Residential
NMRS number: NJ91NE 75
SMR number: NJ91NE0073
Map reference: NJ 9647 1864
Statutory Designation: N/A
Description: Nothing is visible of this cottage, and its site lies beneath the line of the public road about 330m WSW of Blairton farmsteading (NJ91NE 13). The cottage is depicted on the 1st edition of the OS 6-inch map (Aberdeenshire 1869, sheet lvi), but it appears to have been removed before the end of the 19th century and is not shown on the 2nd edition of the map (1901, sheet lvi.SE). Visited by RCAHMS (JRS, RJCMS), 4 March 1999.
(RCAHMS 2006).

Site No: 26
Site name: South Orrock
Site type: Farmstead
NMRS number: NJ91NE 52
SMR number: NJ91NE0061
Map reference: NJ 9616 1908
Statutory Designation: N/A
Description: On the 1st edition OS map it is shown as a C-shaped steading with the court open to the south-east. A rectangular range lies to the north and the court is partially blocked by two small buildings within an enclosure. A further enclosure lies to the east. By the 2nd edition OS map the C-shaped steading has been partially removed and has been combined with the northern range into an L-shaped building. The enclosure to the east has been removed. The southern part of the C-shaped building is now a separate rectangular building. The 2005 map shows that the remains of the steading and the building within the enclosure, probably the farmhouse, remain in use in modified condition
(AC 2006)

Site No: 27
Site name: South Orrock Croft
Site type: Farmstead
NMRS number: NJ91NE 76
SMR number: NJ91NE0080
Map reference: NJ 9600 1910

Statutory Designation: N/A
Description: Nothing is visible of the steading of this croft, which stood in what is now a cultivated field about 100m WNW of South Orrock farmsteading (NJ91NE 52). As depicted on the 1st edition of the OS 6-inch map (Aberdeenshire 1869, sheet lvi), the steading comprised a standing immediately to the SSW of a range. At the end of the 19th century the cottage was still roofed, but by this time the range appears to have been removed and is not shown on the 2nd edition of the map (1901, sheet lvi.SE). Visited by RCAHM (JRS, RJCM), 4 March 1999.
(RCAHMS 2006)

Site No: 28
Site name: Blairton Milestone
Site type: Milestone
NMRS number: N/A
SMR number: NJ91NE0084
Map reference: NJ 9634 1858
Statutory Designation: N/A
Description: Milestone still in use which is shown from the 1st edition OS map onwards. It has the inscription -Aberdeen 8-. It has been moved about 10m S of its original position due to the realignment of the road.
(AC 2006)

Site No: 29
Site name: Blairton (The Cock & Bull)
Site type: Hotel; Inn; Post-office
NMRS number: N/A
SMR number: NJ91NE0085
Map reference: NJ 9665 1931
Statutory Designation: N/A
Description: Hotel still in use and former Post Office. On the 1st edition OS map it is shown as a C-shaped building with the court open to the south-east and marked as a Post Office. By the 2nd edition OS map it has become a hotel, called the -Blairton Hotel- and has two additional rectangular ranges, one to the north-east and one to the south. The 2005 map shows that three buildings are present at the site, one of which is a cottage.
(AC 2006)

Site No: 30
Site name: Sidney Cottage
Site type: Residential
NMRS number: NJ91NE 50
SMR number: NJ91NE0059
Map reference: NJ 9678 1954
Statutory Designation: N/A
Description: Cottage still in use.
(AC 2006)

Site No: 31
Site name: Sidney Cottage sand and gravel workings
Site type: Quarrying
NMRS number: NJ91NE 49
SMR number: NJ91NE0058
Map reference: NJ 9670 1960
Statutory Designation: N/A
Description: Details of these workings, which are of relatively recent date but are now disused and landscaped, can be seen on vertical aerial photography (OS 88/272/016). Visited by RCAHMS (IF, JRS), 5 November 1996. (RCAHMS 2006)

Site No: 32
Site name: Mains of Orrock
Site type: Farmstead
NMRS number: NJ91NE 12.01
SMR number: NJ91NE0028
Map reference: NJ 9632 1960
Statutory Designation: N/A
Description: Farmstead still in use.
(AC 2006)

Site No: 33
Site name: Mains of Orrock Sump
Site type: Farming
NMRS number: N/A
SMR number: N/A
Map reference: NJ 96464 19677
Statutory Designation: N/A
Description: A sump that is revetted into the ground with slightly battered drystone random rubble walls. Walled at the NW, NE and SE sides and is entered from the SW side by means of a grassed slope. It is ca 8m SW-NE x 3.5m NW-SE. The ground around it is heavily poached by cattle and it retains water at the NE end. Visited by Kirkdale Archaeology (AM, TW) 25 October 2006.
(Kirkdale 2006)

Site No: 34
Site name: St Colm's Well, Belhelvie
Site type: Well
NMRS number: NJ91NE 4
SMR number: NJ91NE0014
Map reference: NJ 9693 1967
Statutory Designation: N/A
Description: Well; the surround is of modern construction but it has provided the manse with water since the house was built in the late 18th Century. The basin from the well was recorded in the Manse garden in 1964, in use as a birdbath.
(AC 2006)

Site No: 35
Site name: Pettens Croft
Site type: Croft
NMRS number: N/A
SMR number: NJ91NE0082
Map reference: NJ 9708 1989
Statutory Designation: N/A
Description: Croft. It is depicted on the OS maps from the 1st edition onwards as consisting of two rectangular buildings. On the 2nd edition OS map the northern building has an attached enclosure.
(AC 2006)

Site No: 36
Site name: Pettens (see Photograph 9)
Site type: Farmstead
NMRS number: NJ91NE 84
SMR number: NJ91NE0081
Map reference: NJ 9708 1989
Statutory Designation: N/A
Description: Farmstead still in use.
(AC 2006)

Site No: **37**
Site name: **Menie**
Site type: Findspot
NMRS number: NJ92SE 85
SMR number: NJ92SE0117
Map reference: NJ 97 20 (rough location)
Statutory Designation: N/A
Description: There is a flint arrowhead from 'Menie, Newburgh', (Menie House: NJ 977 204) in the Hunterian Museum, University of Glasgow (GLAHM: B.1951.199). Information from RCAHMS (JRS), 24 February 2000.
(RCAHMS 2006)

Site No: **38**
Site name: **Boghead**
Site type: Farmstead
NMRS number: NJ92SE 43
SMR number: NJ92SE0051
Map reference: NJ 9622 2006
Statutory Designation: N/A
Description: Farmstead still in use that is depicted on the 1867 1st edition OS map. It shows a U-shaped range of steadings with an attached rectangular building, a L-shaped building and two rectangular buildings. By the 1888 2nd edition map the steadings have become one large rectangular block of buildings, the L-shaped building has gone and another rectangular building has been built.
(AC 2006)

Site No: **39**
Site name: **Cross-Stone**
Site type: Residential, Farmstead; Enclosure
NMRS number: N/A
SMR number: NJ92SE0125
Map reference: NJ 9635 2035
Statutory Designation: N/A
Description: Site of a croft which is shown on both the 1st and 2nd edition OS maps. On the 1st edition map (c.1867) it is depicted as consisting of four small buildings with a kite-shaped enclosure to the north-west. By the 2nd edition OS map (c.1888) the westernmost building appears to have been removed. The 2006 map shows two buildings on the site, but earlier OS maps from the latter half of the twentieth century show the croft to have been ruinous.
(AC 2006)

Site No: **40**
Site name: **Hill of Menie**
Site type: Farmstead; Inn
NMRS number: N/A
SMR number: NJ92SE0116
Map reference: NJ 9676 2045
Statutory Designation: N/A
Description: Farmstead still in use and former inn. On the 1st edition OS map it is called the -Hill of Menie Inn- and consists of a courtyard steading of a U-shaped building, with horse-mill attached to the north-west corner and the court opening facing west. Immediately across this opening is a long rectangular building. To the south are three smaller buildings, the largest of which is probably the farmhouse. By the 2nd edition OS map, the farmstead is no longer called an Inn and one of the smaller buildings and the horse-mill have been removed. The farmhouse and the steading, which now has a completely enclosed court and an outshot to the east, are still shown. There is a pond with Mill Dam shown to the west. The 2005 map shows that the buildings are still in use, but that the pond has been removed, its site, however, has not been redeveloped.
(AC 2006)

Site No: 41
Site name: Hardhead
Site type: Residential
NMRS number: N/A
SMR number: NJ92SE0126
Map reference: NJ 9620 2055
Statutory Designation: N/A
Description: Former croft now in use as a pet crematorium. On the 1st edition OS map (c.1867) it is shown as consisting of two small rectangular buildings. By the 2nd edition OS map of 1888 the eastern building has a rectangular enclosure attached to the south front. The 2006 map shows that both buildings are in use, the eastern having being modified and the enclosure removed.
(AC 2006)

Site No: 42
Site name: Snarleshow (Dambrae)
Site type: Farmstead
NMRS number: N/A
SMR number: NJ92SE0115
Map reference: NJ 9667 2070
Statutory Designation: N/A
Description: Farmstead still in use. On the 1st edition OS map it is shown as two L-shaped buildings which are aligned around a central court open at the north-east and south-west. There are three outbuildings and a series of sluices and a pond shown to the south on the artificially channelled burn. By the 2nd edition map the outbuildings have been removed. The 2005 map shows that the remains of the L-shaped buildings have been modified into a much larger structure. The site of the pond has not been developed.
(AC 2006)
Site of possible mill.
(Kirkdale 2006)

Site No: 43
Site name: Cowhill
Site type: Font
NMRS number: NJ92SE 20
SMR number: NJ92SE0019
Map reference: NJ 9616 2092
Statutory Designation: N/A
Description: Stone font with four 'lugs'; found built into wall of garden. May be missing holy stoup, from Petten's Church, which once stood in the garden of Belhelvie Manse but disappeared a number of years ago.
This alleged font may be nothing more than a mortar or small knocking stone, and it is presently situated immediately to the S of the bungalow known as Clach Mhuillin (NJ 9608 2090). It measures 0.32m in overall diameter and 0.18m in depth and it has four external vertical lugs which rise from a flat base to the rim. The internal hollow measures 0.24m in diameter and 0.16m in depth. Visited by RCAHMS (JRS), 15 June 1998.
(RCAHMS 2006)

Site No: 44
Site name: Stoneyards
Site type: Residential; Farmstead; Enclosures
NMRS number: N/A
SMR number: NJ92SE0128
Map reference: NJ 963 209
Statutory Designation: N/A
Description: On the 1st edition OS map (c.1867) it is shown as an L-shaped building. By the 2nd edition map (c.1888) there is a small attached rectangular enclosure on the

east front. The 2006 map shows that the building has been partially removed and modified.
(AC 2006)

Site No: 45
Site name: Stoneyards
Site type: Residential; Enclosures
NMRS number: N/A
SMR number: NJ92SE0127
Map reference: NJ 9641 2091
Statutory Designation: N/A
Description: Former croft now in use as cottages. On the 1st edition OS map (c.1867) it is shown as three buildings, an L-shaped building with a small square building to the east and a rectangular building to the north. By the 2nd edition OS map (c.1888) there is a small extension on the south of the L-shaped building and all three buildings are within an enclosure. The 2006 map shows that only the rectangular building survives and it is divided into two cottages.
(AC 2006)

Site No: 46
Site name: Aikenshill Cottages
Site type: Residential; Enclosures
NMRS number: N/A
SMR number: NJ92SE0121
Map reference: NJ 9687 2160
Statutory Designation: N/A
Description: Cottages still in use which are shown on the OS maps from the 2nd edition map (c.1888) onwards. They are depicted as a small rectangular building within an enclosure.
(AC 2006)

Site No: 47
Site name: Aikenshill
Site type: Farmstead
NMRS number: NJ92SE 44
SMR number: NJ92SE0052
Map reference: NJ 9684 2195
Statutory Designation: N/A
Description: Farmstead still in use.
(AC 2006)

Site No: 48
Site name: Kirkhill Cottage
Site type: Residential
NMRS number: NJ92SE 32
SMR number: NJ92SE0040
Map reference: NJ 9682 2227
Statutory Designation: N/A
Description: Nothing is visible of this cottage which stood in what is now a cultivated field; it is depicted as roofed on the 2nd edition of the OS 6-inch map (Aberdeenshire, sheet lvi.NE, 1901). Visited by RCAHMS (JRS, IF), 4 March 1996.
(RCAHMS 2006)

Site No: 49
Site name: Newtyle Cottage
Site type: Residential
NMRS number: NJ92SE 33
SMR number: NJ92SE0041
Map reference: NJ 9727 2226

Statutory Designation: N/A
Description: Nothing is visible of this cottage which stood at the junction of the A92 trunk road and the minor road to Drums Farm (NJ92SE 40.00); it is depicted as roofed on the 2nd edition of the OS 6-inch map (Aberdeenshire, sheet lvi.NE, 1901). Visited by RCAHMS (JRS, IF), 4 March 1996.
(RCAHMS 2006)

Site No: 50
Site name: Kirkhill
Site type: Residential
NMRS number: NJ92SE 45
SMR number: NJ92SE0053
Map reference: NJ 9652 2244
Statutory Designation: N/A
Description: Country House still in use.
(AC 2006)

Site No: 51
Site name: Kirkhill Upright Stone
Site type: Upright Stone
NMRS number: N/A
SMR number: N/A
Map reference: NJ 96723 22440
Statutory Designation: N/A
Description: An upright stone situated at the E boundary of the field to the E of Kirkhill, next to the B-road to Overhill. Possible boundary stone.
(Kirkdale 2006)

Site No: 52
Site name: Rashiereive
Site type: Residential
NMRS number: NJ92SE 88
SMR number: NJ92SE103
Map reference: NJ 9719 2246
Statutory Designation: N/A
Description: Nothing is visible of this cottage, which stood in what is now the garden of a private house. The cottage is depicted roofed on both the 1st and 2nd editions of the OS 6-inch map (Aberdeenshire 1870, sheet lvi; 1901, sheet lvi.NE). Visited by RCAHMS (JRS), 20 June 2002.
(RCAHMS 2006)

Site No: 53
Site name: Rashiereive
Site type: Enclosures; Farmstead
NMRS number: N/A
SMR number: NJ92SE0102
Map reference: NJ 9717 2252
Statutory Designation: N/A
Description: Small farmstead, now a private dwelling. The farmstead appears on the 2nd edition OS map as a compact C-shaped building with the court open to the south. Two further buildings lie to the south within a subdivided enclosure. The 2005 map shows that the C-shaped building and the larger of the two buildings to the south, probably the farmhouse, are modified and still in use. The remaining building is shown as disused.
(AC 2006)

Site No: 54
Site name: Foveran Free Church
Site type: Church; Manse
NMRS number: N/A

SMR number: NJ92SE0104
Map reference: NJ 9733 2250
Statutory Designation: N/A
Description: Remains of former Free Church and Manse now used as a private dwelling. These buildings are shown on both 1st and 2nd edition OS maps within partially wooded grounds. The 2005 map shows that the Church is now disused and ruinous and the Manse is still in use.
(AC 2006)

Site No: 55
Site name: Kirkhill
Site type: Possible Chapel
NMRS number: N/A
SMR number: N/A
Map reference: NJ 9665 2270
Statutory Designation: N/A
Description: Building and enclosure. Named as Kirkhill on estate map of 1843, the present farm of Kirkhill being named Westfield (NAS RHP 42829). Although there is no known documentary evidence, it is possible that Kirkhill was the site of an early chapel.
(Kirkdale 2006)

Site No: 56
Site name: Cairneylaw
Site type: Farmstead
NMRS number: N/A
SMR number: NJ92SE0101
Map reference: NJ 9719 2270
Statutory Designation: N/A
Description: Remains of a Croft. On the 1st edition OS map it is shown as an L-shaped building with an enclosure attached to the south and a horse-mill attached to the north. By the 2nd edition OS map the horse-mill has been removed and there is an additional building attached to the east side of the enclosure. The 2005 map shows that these structures are disused and that two buildings, probably houses, have been built within the former croft.
(AC 2006)

Site No: 57
Site name: Overhill Cattle Rubbing Stones
Site type: Farming; Rubbing Stone
NMRS number: NJ92SE 35
SMR number: NJ92SE0042
Map reference: NJ 9676 2322, NJ 9678 2284 and NJ 9646 2332.
Statutory Designation: N/A
Description: A cattle-rubbing stone is situated in an arable field 420m SE of the farmhouse at Overhill (NJ92SE 46.00); on the date of visit the field was in crop and access to the stone could not be gained. The stone is not depicted on the 2nd edition of the OS 6-inch map (Aberdeenshire, sheet lvi.NE, 1901) indicating that it was probably set up relatively recently. Visited by RCAHMS (JRS), 15 June 1998.
(RCAHMS 2006)
Three rubbing stones still in use, they are located at NJ 9676 2322, NJ 9678 2284 and NJ 9646 2332.
(AC 2006)

Site No: 58
Site name: Newtyle Croft
Site type: Croft
NMRS number: NJ92SE 87
SMR number: N/A
Map reference: NJ 9769 2284

Statutory Designation: N/A
Description: Nothing is visible of this cottage, which stood at the edge of what is now a cultivated field immediately NW of Mardon Park. The cottage is depicted roofed on the 1st edition of the OS 6-inch map (Aberdeenshire 1870, sheet lvi), but it appears to have been removed before the end of the 19th century and is not shown on the 2nd edition of the map (1901, sheet lvi.NE). Visited by RCAHMS (JRS), 20 June 2002.
(RCAHMS 2006)

Site No: 59
Site name: Blairythan Smithy
Site type: Smithy
NMRS number: NJ92SE 59
SMR number: NJ92SE0068; NJ92SE0122
Map reference: NJ 9710 2337
Statutory Designation: N/A
Description: Site of a smithy, the building of which is still in use.
(AC 2006)

Site No: 60
Site name: Upper Pitgersie
Site type: Residential; Farmstead; Enclosure
NMRS number: N/A
SMR number: NJ92SE0130
Map reference: NJ 9720 2365
Statutory Designation: N/A
Description: Former croft. On the 1st edition OS map (c.1867) it is shown as a group of four buildings, on T-shaped, within an enclosure. By the 2nd edition OS map (c.1888) two of the buildings have been removed and the remaining smaller building has been extended. The 2006 map shows that both buildings are in use in modified condition.
(AC 2006)

Site No: 61
Site name: Upper Pitgersie
Site type: Milestone
NMRS number: N/A
SMR number: NJ92SE0124
Map reference: NJ 9725 2370
Statutory Designation: N/A
Description: Milestone still in use which is shown on the OS maps from the 1st edition map onwards (c.1867). It is some 55m south of the position indicated on the earlier maps. It marks the distance -Aberdeen 11-.
(AC 2006)

Site No: 62
Site name: Pitgersie Bridge cropmark
Site type: Cropmark
NMRS number: N/A
SMR number: NJ92SE0100
Map reference: NJ 9734 2390
Statutory Designation: N/A
Description: Two circular features of unknown origin are visible on the aerial photograph overlay at the Aberdeenshire SMR and on vertical aerial photographs taken in 1976 and 1988. The smaller is within the larger which is 43.5m in diameter.
(AC 2006)
Visible as a greener patch of vegetation within a grassed flood plain. Visited by Kirkdale Archaeology (AM, TW), 25 October 2006.
(Kirkdale 2006)

Site No: 63
Site name: Oldmill
Site type: Residential; Farmstead; Enclosure
NMRS number: N/A
SMR number: NJ92SE0099
Map reference: NJ 9730 2425
Statutory Designation: N/A
Description: Croft. On the 1st edition OS map it is shown as two buildings, the northern small and rectangular, the southern L-shaped, each with an attached enclosure. By the 2nd edition OS map the northern building has an additional small enclosure attached to the south-east corner. The 2005 map shows that the smaller building is in use, but the L-shaped building has had the projecting wing removed and is disused.
(AC 2006)

Site No: 64
Site name: Kingston
Site type: Residential; farmstead
NMRS number: N/A
SMR number: NJ92SE0085
Map reference: NJ 978 243
Statutory Designation: N/A
Description: A roughly Z-shaped building and five other buildings are depicted on the OS map of 1867 at Kingston. By the 1888 edition only 2 survived. Nothing is visible at this location now.
(AC 2006)

Site No: 65
Site name: Pitmillan
Site type: Farmstead
NMRS number: NJ92SE 58
SMR number: NJ92SE0067
Map reference: NJ 9800 2460
Statutory Designation: N/A
Description: Farmstead still in use. It is depicted on the OS maps of 1867 & 1888 as an almost rectangular range with central open court. There is an entrance on the SW side. The NW range extends both to the north and south. A L-shaped building, presumably the house, lies to the south and two small cottages to the west. Today the farmstead had been greatly extended with a number of new buildings. The original is no longer standing.
(AC 2006)

Site No: 66
Site name: Fountainbleau
Site type: Farmstead
NMRS number: NJ92NE 75
SMR number: NJ92NE0069
Map reference: NJ 9748 2580
Statutory Designation: N/A
Description: Farmstead still in use. On the 1st edition OS map it is shown as a C-shaped steading with the court open to the north-east within an enclosure with a pond to the north. A horse-mill is shown attached to the west of the steading. A building within a triangular enclosure is shown to the west. By the 2nd edition OS map this latter building has been removed, as has the majority of the steading, including the horse-mill. A near square building has replaced the steading, with remnants of the wings of the C-shaped building now standing as smaller structures. The southern of these is now contained in a triangular enclosure and is possibly the farmhouse. The pond is still shown with an additional small building to its south. The 2005 map shows that there are two buildings in use, the square steading and the possible farmhouse to the south. None of the enclosures are shown and the pond is not marked, but the site has not been redeveloped.

The site of the probable farmhouse and triangular enclosure on the 1st edition map has been removed for the widening of the public road from B road to A road.
(AC 2006)

Site No: 67
Site name: Fountainbleau
Site type: Cropmark
NMRS number: NJ92NE 19
SMR number: NJ92NE0019
Map reference: NJ 9723 2582
Statutory Designation: N/A
Description: The site of this possible enclosure lies on the crest of a NNE-facing scarp within a cultivated field some 200m W of Fountainbleau steading. Nothing was visible of the enclosure on the date of visit. Visited by RCAHMS (ATW, JRS), 29 January 1997.
(RCAHMS 2006)

Site No: 68
Site name: South Farden
Site type: Farmstead
NMRS number: NJ92NE 80
SMR number: NJ92NE0056
Map reference: NJ 9705 2606
Statutory Designation: N/A
Description: Farmstead still in use. On the 1st edition OS map it is shown as an L-shaped building with possible attached horse-mill on the west. To the north is a partially wooded enclosure. By the 2nd edition OS map the building has been removed and replaced by a smaller L-shaped building and a rectangular building on a different alignment. The enclosure is no longer shown as wooded. The 2005 map shows that parts of these buildings are still in use, but both have been incorporated into larger structures.
(AC 2006)

Site No: 69
Site name: South Farden
Site type: Residential
NMRS number: NJ92NE 76
SMR number: NJ92NE0055
Map reference: NJ 9732 2606
Statutory Designation: N/A
Description: Nothing is now visible of a cottage that stood at the edge of a cultivated field 270m NW of Fountainbleau steading (NJ92NE 75). It is depicted as roofed on 1st edition of the OS 6-inch map (Aberdeenshire, sheet xlvii, 1870) but had been removed before the end of the 19th century and is not indicated on the 2nd edition of the map (sheet xlvii.SE, 1901). Visited by RCAHMS (JRS, ATW), 28 January 1997.
(RCAHMS 2006)

Site No: 70
Site name: Bridgend
Site type: Farmstead; milestone
NMRS number: N/A
SMR number: NJ92NE0053 & NJ92NE0054
Map reference: NJ 968 266
Statutory Designation: N/A
Description: NJ92NE0053: Site of a now destroyed farmstead shown on both the 1st and 2nd edition OS maps. It is depicted as a T-shaped building with a smaller building to the south-east. The site has been redeveloped for housing. NJ92NE0054: Site of a now destroyed milestone, which had the inscription -Aberdeen 13-, which is shown on both the 1st and 2nd edition OS maps.
(AC 2006)

Site No: **71**
Site name: **Tipperty Brickworks**
Site type: Industrial; Brickworks
NMRS number: NJ92NE 22
SMR number: NJ92NE0013
Map reference: NJ 9695 2679
Statutory Designation: N/A
Description: Tipperty Tile Works, early 20th century. A most interesting complex, producing tile field drains. There is a range of four circular kilns, enclosed in a 2-storey building, with 3 circular-section, iron-bound chimneys. The floors above the kilns are used for drying the 'green' pipes after extrusion, as are pantile- and asbestos-roofed single-storey drying sheds. The pug mill and extrusion plant, conveyors and other machinery are driven by a Ruston & Hornsby 2-cylinder horizontal diesel engine, size 8 class HR6, works no. 351331. There is a 2ft (0.6m) gauge railway, in two sections, linking the works with the claypit. This brick- and tileworks operated from pre-1860 to 1980. It comprised four round downdraught (intermittent) kilns, and was mostly demolished by 1981; NMRS, MS/500/41/4 (visited 1978). Tipperty brickworks was closed in 1980 and is now in use as an industrial unit. After closure, most of the brickworks was demolished, but at least one large brick-built building and a tall chimney still survive. Visited by RCAHMS (ATW, JRS), 29 January 1997.
(RCAHMS 2006)

Site No: **72**
Site name: **Mill of Foveran Lade**
Site type: Lade
NMRS number: N/A
SMR number: N/A
Map reference: NJ 9745 2395
Statutory Designation: N/A
Description: The Lade for the Mill of Foveran is shown on the current OS map running parallel to the road from Foveran to the Mill of Foveran.
(Kirkdale 2006)

Site No: **73**
Site name: **Blairythan**
Site type: Windpump
NMRS number: N/A
SMR number: NJ92SE0123
Map reference: NJ 9682 2345
Statutory Designation: N/A
Description: Site of a now destroyed windpump which is shown only on the 2nd edition OS map (c.1888).
(AC 2006)

Site No: **74**
Site name: **Menie Smithy**
Site type: Smithy
NMRS number: NJ92SE 24
AC number: NJ92SE0033
Map reference: NJ 9695 2109
Statutory Designation: N/A
Description: Site of a smithy.
(AC 2006)

Site No: **75**
Site name: **Delfrigs**
Site type: Crofts; Enclosures
NMRS number: N/A
AC number: NJ92SE0109

Map reference: NJ 9691 2115
Statutory Designation: N/A
Description: Remains of a croft which is shown on the 2nd edition OS map. It is depicted as a small rectangular building within a trapezoidal enclosure. The 2005 map shows that the enclosure is in use with later buildings within it.
(AC 2006)

Site No: 76
Site name: Delfrigs
Site type: Residential; Farmstead; Enclosures;
NMRS number: N/A
AC number: NJ92SE0110
Map reference: NJ 9696 2112
Statutory Designation: N/A
Description: Croft. On the 1st edition OS map it is shown as a small rectangular building with possible horse-mill attached on the north and an outshot at the middle of the south, possibly a porch. By the 2nd edition OS map, there is no possible horse-mill, but there are a second building and an enclosure to the north-west. The 2005 map shows that both of these buildings are in use.
(AC 2006)

Site No: 77
Site name: Glengerrach
Site type: Residential; Garden; School
NMRS number: N/A
AC number: NJ92SE0111
Map reference: NJ 9695 2101
Statutory Designation: N/A
Description: Cottages still in use. On the 1st edition OS map the buildings are marked as a school. By the 2nd edition OS map they appear to be in use as cottages.
(AC 2006)

Site No: 78
Site name: Menie milestone
Site type: Milestone
NMRS number: N/A
AC number: NJ92SE0114
Map reference: NJ 9687 2065
Statutory Designation: N/A
Description: Milestone still in use, which is shown on OS maps from the 1st edition onwards. It has the inscription -Aberdeen 9-.
(AC 2006)

Site No: 79
Site name: Temple Stones
Site type: Stone Circle
NMRS number: NJ91NE 7.0
AC number: NJ91NE0006
Map reference: NJ 9529 1636
Statutory Designation: Scheduled Ancient Monument
Description: Recumbent stone circle; only the recumbent, its flankers, both fallen, and a fourth stone remain. Three smaller stones at the site may have formed part of the circle. Several of the stones bear cup-marks. Field clearance heap in the centre of the site.
(AC 2007)

Site No: 80
Site name: Hatton Farmsteading
Site type: Farmstead
NMRS number: NJ91NE 33.1

AC number: NJ91NE0040
Map reference: NJ 962 159
Statutory Designation: N/A
Description: Farmsteading. This is now the site of the weighbridge/ entrance to a landfill site. Access was impossible but no sign of the building could be seen from the road.
(Kirkdale 2007)

Site No: 81
Site name: Hatton Farmhouse
Site type: Farmhouse
NMRS number: NJ91NE.33.0
AC number: NJ91NE0041
Map reference: NJ 962 161
Statutory Designation: N/A
Description: Farmhouse still in use.
(AC 2007)

Site No: 82
Site name: Bairnie Hillock
Site type: Cairn, Barrow
NMRS number: NJ91NE 11.0
AC number: NJ91NE0007
Map reference: NJ 9628 1622
Statutory Designation: N/A
Description: Round cairn/ barrow; a small cairn occupying a prominent knoll on edge of a meltwater channel. A two-phase monument consisting of a low but substantial circular cairn c14m diameter and 0.8m high, built on a burnt old land surface on which a small quantity of cremated bone and flint flakes were scattered. This cairn was subsequently enlarged by the insertion of a food vessel cremation & the addition of a barrow up to 1.2m high of burnt turf and sandy subsoil. The food vessel was found prior to excavation, on the S side , where it had been exposed by animal erosion. The cremated bones were of a relatively young adult.
(AC 2007)

Site No: 83
Site name: Hatton of Millden
Site type: Farmstead
NMRS number: NJ91NE 55.0
AC number: NJ91NE0065
Map reference: NJ 963 163
Statutory Designation: N/A
Description: Farmstead, still in use.
(AC 2007)

Site No: 84
Site name: Millden
Site type: Farmstead
NMRS number: NJ91NE 56.0
AC number: NJ91NE0066
Map reference: NJ 961 163
Statutory Designation: N/A
Description: Farmstead, still in use
AC 2007)

Site No: 85
Site name: Wester Hatton Cottages Cropmark
Site type: Cropmark; rig
NMRS number: NJ91NE 36

AC number: NJ91NE0045
Map reference: NJ 9568 1524
Statutory Designation: N/A
Description: Vertical aerial photography (OS 82/162/035) has revealed a roughly circular cropmark measuring about 10m in diameter on a gentle SE-facing slope 140m SW of Wester Hatton Cottages (NJ91NE 34.01). Other cropmarks in the field include lengths of arc (at NJ 9569 1527 and 9567 1520) and broad rig-and-furrow cultivation. The rig appears where the underlying gravel is close to the surface, and comprises two separate plots: one, centred at NJ 9565 1513, contains rigs aligned roughly NW and SE; the other, centred at 9572 1528, contains rigs aligned roughly E and W, which run under the A92 (T) public road as far as the former line of the road to the S of Wester Hatton Cottages. Information from RCAHMS (JRS), 18 April 1996.
(RCAHMS 2007)

Site No: 86
Site name: Wester Hatton Cottages
Site type: Cottages
NMRS number: NJ91NE 34.01
AC number: NJ91NE0043
Map reference: NJ 9581 1532
Statutory Designation: N/A
Description: Cottages still in use
(AC 2007)

Site No: 87
Site name: Wester Hatton Quarry
Site type: Trial excavation; flint artefact
NMRS number: NJ91NE 64
AC number: N/A
Map reference: NJ 956 154
Statutory Designation: N/A
Description: NJ 956 154 An archaeological evaluation was carried out in advance of a proposed land fill. Twenty-eight trenches, each 50 x 2m, were excavated. Four cut features of unknown date were recorded. The remains of cultivation furrows provided evidence of agricultural activity prior to the 19th century, while a number of field drains gave evidence of continued agricultural use into the 19th and 20th centuries. One piece of worked flint was retrieved from the topsoil.
(RCAHMS 2007)

Site No: 88
Site name: Fife
Site type: Farmsteading
NMRS number: NJ91NE 69
AC number: NJ91NE0077
Map reference: NJ 9580 1510
Statutory Designation: N/A
Description: Nothing is visible of this steading, which stood at the edge of what is now a cultivated field about 210m S of Wester Hatton Cottages (NJ91NE 39.01). As depicted on the 1st edition of the OS 6-inch map (Aberdeenshire 1869, sheet lxvi), the steading comprised three buildings. One was U-shaped on plan, with its open side facing W on to a long range to enclose a central yard entered through a narrow opening on the N. The third building lay immediately N of the U-shaped range, which also had a horse-engine attached to its S side. The steading appears to have been removed before the end of the 19th century and it is not shown on the 2nd edition of the map (Aberdeenshire 1901, sheet lxvi.NE). Visited by RCAHMS (JRS, RJCM), 4 March 1999.
(RCAHMS 2007)

Site No: 89
Site name: Wester Hatton Cropmark
Site type: Cropmark
NMRS number: NJ91NE 35
AC number: NJ91NE0044
Map reference: NJ 9576 1561
Statutory Designation: N/A
Description: Vertical aerial photography (OS 82/162/035) has recorded a roughly circular cropmark, possibly representing an old sand- or gravel-pit measuring about 17m in diameter, on a gentle SE-facing slope 70m NW of Wester Hatton farmhouse (NJ91NE 34.00). Although the cropmark is generally forms a solid disc, the SE (downhill) side is less well-defined, and there are two faceted edges on the N and NE. Information from RCAHMS (JRS), 18 April 1996.
(RCAHMS 2007)

Site No: 90
Site name: Wester Hatton Farmstead
Site type: Farmsteading
NMRS number: NJ91NE 34.00
AC number: NJ91NE0042
Map reference: NJ 9585 1558
Statutory Designation: N/A
Description: Farmstead still in use.
(AC 2007)

APPENDIX 12.2

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APPENDIX 12.3

ARCHAEOLOGICAL EFFECTS SUMMARY TABLE

#	Name	Description	Significance of Resource	Potential Impacts of Scheme	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect	Comments
1	Hare Cairn	Bronze Age Cairn	National importance	No physical impact predicted but B977 would have a medium (negative) impact on setting	No physical effect, but a Major Adverse Effect on setting	Road designed in a manner sympathetic to the landscape.	Moderate Adverse Effect on setting	Scheduled Ancient Monument Impact on setting to be considered
2	Balmedie House Lodge	19th Century Lodge House behind 18th Century Gate Piers	Local importance	No physical or setting impact predicted	No Effect	None required	No Effect	Category C (S) Listed Building Impact on setting to be considered
3	Balmedie House	19th Century Mansion House	Local importance	No physical or setting impact predicted	No Effect	None required	No Effect	Category C (S) Listed Building Impact on setting to be considered
4	Orrock House, Dovecot	18th Century Dovecot	Regional importance	No physical impact predicted but new A90 (T) would have a low (negative) impact on setting	No physical effect, but a Minor Adverse Effect on setting	Road designed in a manner sympathetic to the landscape.	Minor Adverse Effect on setting	Category B Listed Building Impact on setting to be considered
5	Orrock House and Gatepiers	18th Century manor/ mansion house with residual designed landscape and gate piers	National importance.	No physical impact predicted but new A90 (T) would have a medium (negative) impact on setting	No physical effect, but a Major Adverse Effect on setting	Road designed in a manner sympathetic to the landscape.	Moderate Adverse Effect on setting	Category A Listed Building (gatepiers are Category B listed) Impact on setting to be considered
6	Belhelvie Old Parish Church	18th Century Church with morthouses. Site possibly occupied by church since	Regional importance	No physical impact predicted but new A90 (T) would have a low (positive) impact	No physical effect, but a Minor Beneficial Effect on setting	None required	Minor Beneficial Effect on setting	Category B Listed Building Impact on setting to be considered

#	Name	Description	Significance of Resource	Potential Impacts of Scheme	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect	Comments
		12th Century		on setting				
7	Menie House	19th Century Mansion house which incorporates an 18th Century building. Remnants of associated designed landscape.	Regional importance	No physical or setting impact predicted	No Effect	None required	No Effect	Category B Listed Building Impact on setting to be considered
8	Menie House Lodge	19th Century Lodge House associated with Menie House	Regional importance	No physical impact predicted but new A90 (T) would have a medium (positive) impact on setting	No physical effect, but a Moderate Beneficial Effect on setting	None required	Moderate Beneficial Effect on setting	Category B Listed Building (considered within curtilage of Menie House) Impact on setting to be considered
9	Mill of Foveran	17th Century Girnel, remodelled in 19th Century as a farmhouse. Associated Watermill is 18th Century in date, again remodelled in 19th Century.	Regional importance	No physical impact predicted but new A90 (T) would have a medium impact on setting	No physical effect, but a Moderate Adverse Effect on setting	Road designed in a manner sympathetic to the landscape.	Minor Adverse Effect on setting	Category B Listed Building Impact on setting to be considered
10	Mains of Newtyle	Farmstead, still in use.	Local importance	No physical impact predicted	No Effect	None required	No Effect	
11	Southfolds Farm	Farmstead, still in use.	Local importance	No physical impact predicted	No Effect	None required	No Effect	
12	Southfolds	Demolished Cottage.	Local importance	No Physical impact predicted	No Effect	None required	No Effect	Nothing now visible at this site
13	Eggie	Farmsteading.	Local	No physical	No Effect	None required	No Effect	

#	Name	Description	Significance of Resource	Potential Impacts of Scheme	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect	Comments
		Site now occupied by a late19th Century farm house and a modern library.	importance	impact predicted				
14	Grey Gables	Findspot of a dolerite axe.	Local importance	No Physical impact predicted.	No Effect	None required	No Effect	
15	Keir Quarry	Late 19th – Early 20th Century quarry, now almost completely infilled	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
16	Keir cist burial	Unconfirmed location of a Bronze Age burial of a young female and associated grave goods.	Regional importance	No Physical impact predicted	No Effect	None required	No Effect	May be indicative of other sites in the area
17	Keir	Farmstead, still in use.	Local importance	No Physical impact predicted.	No Effect	None required	No Effect	
18	Dykenook (near Drumhead)	Site of a demolished farmstead	Local importance	No Physical impact predicted.	No Effect	None required	No Effect	
19	Drumhead Cottage	Cottage, still in use	Local importance	No Physical impact predicted.	No Effect	None required	No Effect	
20	Drumhead Lodge	Lodge, still in use	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
21	Belhelvie North Church	Parish church, still in use	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
22	Belhelvie War Memorial	World War I and II war memorial	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
23	Drumhead	Farmstead, still in use.	Local importance	No Physical impact predicted	No Effect	None required	No Effect	

#	Name	Description	Significance of Resource	Potential Impacts of Scheme	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect	Comments
24	Drumhead cropmark	Faint cropmark of rig and furrow and possible circular feature	Local importance	New A90 (T) would have a medium impact on archaeological features.	Minor Adverse Effect	Site trial trenched to reveal extent of archaeology. Further excavation if required.	Minor Adverse Effect	
25	Blairton Cottage	Site of a building that was demolished before the end of the 19th Century.	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
26	South Orrock	Farmstead, still in use.	Local importance	No Physical impact predicted.	No Effect	None required	No Effect	
27	South Orrock Croft	Site of a demolished building	Local importance	No Physical impact predicted.	No Effect	None required	No Effect	
28	Blairton milestone	Milestone, still in use	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
29	Blairton (Cock and Bull)	Former Hotel and Post Office, now in use as a restaurant/public house.	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
30	Sidney Cottage	Cottage, still in use.	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
31	Sidney Cottage sand and gravel workings	Disused and landscaped quarry	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
32	Mains of Orrock	Farmstead, still in use.	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
33	Mains of Orrock Sump	A stone built sump revetted	Local importance	No Physical impact predicted	No Effect	None required	No Effect	

#	Name	Description	Significance of Resource	Potential Impacts of Scheme	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect	Comments
		into ground near Mains of Orrock						
34	St Colm's Well	Well , of modern construction, but in use since late 18th Century	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
35	Pettens Croft	Croft	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
36	Pettens	Farmstead, still in use.	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
37	Menie arrowhead	Imprecise findspot of a flint arrowhead	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
38	Boghead	Farmstead, still in use.	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
39	Cross-Stone	Site of a croft	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
40	Hill of Menie	Farmstead, still in use, and site of a former inn.	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
41	Hardhead (Wardhead)	Former croft, now a pet crematorium.	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
42	Snarleshow (Dambrae)	Farmstead, still in use.	Local importance	Possible mill lade would be cut through by the new road. Equivalent to a low impact.	Minor Adverse Effect	Site recorded to a suitable standard	Minor Adverse Effect	
43	Cowhill	Site of a possible font originally from site 6	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
44	Stoneyards	Building, still in use.	Local importance	No Physical impact predicted	No Effect	None required	No Effect	

#	Name	Description	Significance of Resource	Potential Impacts of Scheme	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect	Comments
45	Stoneyards	Croft now in use as cottages	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
46	Aikenshill Cottages	Cottages, still in use.	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
47	Aikenshill	Farmstead, still in use.	Local importance	No Physical impact predicted.	No Effect	None required	No Effect	
48	Kirkhill Cottage	Site of a now demolished cottage.	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
49	Newtyle Cottage	Site of a now demolished cottage.	Local importance	No physical impact predicted	No Effect	None required	No Effect	
50	Kirkhill	Country House, still in use	Local importance	No physical impact predicted	No Effect	None required	No Effect	
51	Kirkhill Upright Stone	Possible boundary marker	Local importance	New B-road link Kirkhill would have a high impact on the stone.	Moderate Adverse Effect	Site recorded to a suitable standard. Stone relocated to a similar location close by.	Minor Adverse Effect	
52	Rashiereive	Site of a demolished cottage.	Local importance	No physical impact predicted	No Effect	None required	No Effect	
53	Rashiereive	Farmstead, still in use.	Local importance	No physical impact predicted	No Effect	None required	No Effect	
56	Foveran Free Church	Remains of Church and Manse, still in use.	Local importance	No Physical impact predicted.	No Effect	None required	No Effect	
55	Kirkhill	Site of a possible chapel	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
56	Cairneylaw	Remains of a croft	Local importance	No Physical impact predicted.	No Effect	None required	No Effect	

#	Name	Description	Significance of Resource	Potential Impacts of Scheme	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect	Comments
57	Overhill Cattle Rubbing Stones	Upright Cattle rubbing stone	Local importance	Junction at Kirkhill would have a high impact on one of the stones (NJ 9678 2284)	Moderate Adverse Effect	Site recorded to a suitable standard. Stone relocated to a similar location close by.	Minor Adverse Effect	
58	Newtyle Croft	Site of a demolished cottage	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
59	Blairythan Smithy	Site of a smithy, building still in use	Local importance	No Physical impact predicted.	No Effect	None required	No Effect	
60	Upper Pitgersie	Former croft, still in use	Local importance.	No Physical impact predicted	No Effect	None required	No Effect	
61	Upper Pitgersie milestone	Milestone, still in use	Local importance.	No Physical impact predicted	No Effect	None required	No Effect	
62	Pitgersie Bridge cropmark	Site of 2 circular features identified on aerial photography. Unknown date and purpose.	Local importance	Road passes immediately to the east of the cropmark. Likely to have a low physical impact on the site.	Minor Adverse Effect	Site trial trenched to reveal extent of archaeology. Further excavation if required.	Minor Adverse Effect	
63	Oldmill	Croft, still in use	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
64	Kingston	Site of demolished buildings	Local importance	No Physical impact predicted.	No Effect	None required	No Effect	
65	Pitmillan	Farmstead, still in use.	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
66	Fountainbleau	Farmstead, still in use.	Local importance	No Physical impact predicted.	No Effect	None required	No Effect	
67	Fountainbleau	Site of a possible	Regional	No Physical	No Effect	None required	No Effect	

#	Name	Description	Significance of Resource	Potential Impacts of Scheme	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect	Comments
	cropmark	enclosure	importance	impact predicted				
68	South Farden	Farmstead, still in use.	Local importance	No Physical impact predicted.	No Effect	None required	No Effect	
69	South Farden demolished cottage	Site of a demolished cottage	Local importance	No Physical impact predicted.	No Effect	None required	No Effect	
70	Bridgend	Site of a demolished farmsteading and milestone	Local importance	No Physical impact predicted.	No Effect	None required	No Effect	
71	Tipperty Brickworks	Early 20th Century brick and tile works	Local importance	No Physical impact predicted.	No Effect	None required	No Effect	
72	Mill of Foveran Lade	Site of a possible lade	Local importance	New road would cut through the lade and have a low physical impact	Minor Adverse Effect	Site recorded to a suitable standard	Minor Adverse Effect	
73	Blairythan windpump	Site of a destroyed windpump	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
74	Menie Smithy	Site of a smithy, building still in use	Local importance.	No Physical impact predicted	No Effect	None required	No Effect	
75	Delfrigs	Remains of a croft, later buildings on site	Local importance.	No Physical impact predicted	No Effect	None required	No Effect	
76	Delfrigs	Croft, still in use	Local importance.	No Physical impact predicted	No Effect	None required	No Effect	
77	Glengerrach	Former school, now in use as cottages	Local importance.	No Physical impact predicted	No Effect	None required	No Effect	
78	Menie Milestone	Milestone still in use	Local importance.	No Physical impact predicted	No Effect	None required	No Effect	

#	Name	Description	Significance of Resource	Potential Impacts of Scheme	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect	Comments
79	Temple Stones	Recumbent Stone Circle	National importance	No physical or setting impact predicted	No Effect	None required	No Effect	Scheduled Ancient Monument
80	Hatton Farmstead	Site of a farmstead	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
81	Hatton Farmhouse	Farmhouse still in use	Local importance	No Physical impact predicted	No Effect	None required	No Effect	
82	Bairnie Hillock	Bronze age barrow	Local importance.	No Physical impact predicted	No Effect	None required	No Effect	
83	Hatton of Millden	Farmstead still in use	Local importance.	No Physical impact predicted	No Effect	None required	No Effect	
84	Millden	Farmstead still in use	Local importance.	No Physical impact predicted	No Effect	None required	No Effect	
85	Wester Hatton Cottages Cropmark	Roughly circular cropmark and rig and furrow	Local importance.	No Physical impact predicted	No Effect	None required	No Effect	
86	Wester Hatton Cottages	Cottages still in use	Local importance.	No Physical impact predicted	No Effect	None required	No Effect	
87	Wester Hatton Quarry	Site of a trial excavation and flint artefact	Local importance.	No Physical impact predicted	No Effect	None required	No Effect	
88	Fife	Demolished farmstead	Local importance.	No Physical impact predicted	No Effect	None required	No Effect	
89	Wester Hatton Cropmark	Possible gravel pit cropmark	Local importance.	No Physical impact predicted	No Effect	None required	No Effect	
90	Wester Hatton Farmstead	Farmstead still in use	Local importance.	No Physical impact predicted	No Effect	None required	No Effect	

13 DISRUPTION DUE TO CONSTRUCTION

13.1 INTRODUCTION

This chapter examines the effects of disruption from construction of the scheme. The scope of the chapter focuses on traffic effects which are not covered elsewhere in the ES. Environmental effects on people from construction activities are reported in the following chapters:

- Land Use and Property (Chapter 6);
- Geology and Soils (Chapter 8);
- Visual Effects (Chapter 11);
- Noise and Vibration (Chapter 14);
- Air Quality (Chapter 15);
- Pedestrians, Cyclists, Equestrians and Community Effects (Chapter 16); and
- Vehicle Travellers (Chapter 17).

Environmental effects on the natural and cultural heritage from construction are reported in the following chapters:

- Water Quality and Drainage (Chapter 9);
- Ecology and Nature Conservation (Chapter 10);
- Landscape Effects (Chapter 11); and
- Archaeology and Cultural Heritage (Chapter 12).

The following potential effects from construction are considered in this chapter:

- traffic disruption and delays on the existing road network caused by construction activities. These may involve temporary traffic signalling, lane closures and temporary road diversions (the effects of such disruption on severance of community journeys is addressed in Chapter 16);
-
- local environmental impacts on people as a result of temporary increases in traffic on the existing road network (for example as a result of the transport of spoil) and on temporary diversion routes; and
-
- other disruption impacts of construction including disruption to existing utilities (see also Chapter6).

The study area for the appraisal includes the existing road network in the immediate vicinity of the proposed scheme. An assessment of the effects of diversions and on-site construction activities on conditions for vehicle travellers is reported in Chapter 17.

13.2 SOURCES OF INFORMATION

The following sources of information have informed the appraisal:

- assumptions on construction sequence and in particular temporary diversions and haul routes;
- 1:25,000 OS map Ellon & Inverurie; and
- feedback from consultations.

13.3 CONSULTATIONS

Aberdeenshire Council advised that prior to works commencing on site the contractor should discuss the proposed working methods associated with potential for disruption with Aberdeenshire Council Transportation Department, BEAR Scotland (who currently maintain the trunk road on behalf of Transport Scotland) and Grampian Police.

13.4 BASELINE

Baseline information for this appraisal is included in other sections of the ES. Information about properties in proximity to the route is included in Section 6.4.6 and 6.4.7 and properties within 100m listed in Tables 6.2 and 6.3. Traffic flows (baseline and during operation) are described in Chapter 4 and shown on Figure 4.2. Information about the likely quantities of cut and fill materials is given in Section 3.3.7.

Information about construction activities which could give rise to disruption is set out in Section 13.6. Further information about working hours and other issues relating to construction is provided in Sections 3.3.5 and 3.3.9.

13.5 ASSESSMENT METHODOLOGY

A qualitative assessment of the traffic effects of the construction activities has been undertaken taking account of the potential impacts which have been identified (see Section 13.7) and the mitigation measures which would be implemented (see Section 13.8).

The following assumptions have been made in the appraisal:

- the majority of construction traffic would initially access the site using the existing road network and would then use the internal haul road for the majority of trips within the works;
- current flows on the existing network are as summarised in Chapter 4;
- during construction daily HGV numbers on the existing A90 could increase by some 6% at Balmedie the majority of which would be moving earth to embankment works further north. Apart from this the majority of earthworks movements would use internal haul roads within the land made available for construction. At other times during the contract there would be an increase in traffic on local roads as a result of construction related activities but these would be less than the increases at Balmedie;
- for the purposes of assessment it has been assumed that all construction materials would be imported to and exported from the site by road;
- the actual traffic movements associated with construction of the proposals would depend on the stage of construction and the detailed phasing of activities; and
- details of construction methods and locations of site compounds would be finalised following appointment of a contractor. For the purpose of the ES, it has been assumed that construction activities would be undertaken within the corridor of land to be acquired for the scheme.

The approach taken for the assessment follows the guidance provided in the Design Manual for Roads and Bridges (DMRB) Volume 11[190]. DMRB does not

[190] Department of Transport/Scottish Office Industry Department/Welsh Office/Department of the Environment for Northern Ireland (1993) Design Manual for Roads and Bridges, Volume 11: Environmental Assessment. HMSO. Department of Transport/Scottish Office Industry Department/Welsh Office/Department of the

provide specific criteria for the evaluation of impacts arising from construction disturbance, therefore the approach of this assessment is to provide a qualitative comment on the levels of traffic and environmental impact identified at each location where traffic effects are predicted.

Traffic using the existing road network would be affected by the proposed scheme wherever alterations to the local network in terms of diversions, temporary route closures or lane closures are required. These would affect traffic flows along the affected sections of the existing road network and on roads experiencing changes in flows due to traffic diverting, with consequent impacts on the surrounding environment.

The extent to which traffic might be affected by construction would be influenced by the following factors:

- the requirement to use diversions around specific construction areas, and whether existing roads may be used or temporary roads have to be constructed;
- the proximity of diversion routes to local communities or sensitive natural environments;
- the additional journey distance and time experienced by traffic being diverted around construction areas;
- the requirement for temporary traffic signals (which causes delays);
- the need for lane closures, in particular at tie-ins to the existing network;
- the duration for which measures are active; and
- delays caused by construction traffic using public roads.

The assessment considers the effects of transportation of fill, spoil and scheme construction materials on the road network in the vicinity of the works which would mainly be by Heavy Goods Vehicle (HGV). Assumptions made in estimating the numbers of HGV movements are presented in Chapter 3.

The criteria which have been adopted for assessing the significance of predicted traffic flow changes, in terms of traffic impacts and environmental impacts are presented in Table 13.1. A number of sources of guidance have been used because DMRB does not provide specific thresholds of criteria for evaluating the significance of HGV increases on traffic flows or their environmental impact.

The table indicates that much of the available guidance on assessing traffic and environmental impacts has been developed in connection with development proposals (e.g. new retail premises, factories etc) rather than for temporary construction periods. Nevertheless, the references provide an indication of the potential for significant impacts associated with traffic generation generally and the guidance has been broadly adopted for this assessment of construction related traffic effects.

Environment for Northern Ireland (1994) First Amendment to Design Manual Volume 11. HMSO. The technical chapters of the DMRB have subsequently been updated and amended on a number of occasions

Table 13.1 Criteria for Assessment of Significance of Construction Traffic Effects

Potential Impact	Assessment Criteria	Note
Traffic Conditions	Potentially significant impact if: • traffic flows increase by 10% or more • traffic flows increase by 5% or more where network is congested • over 100 trips from site generated in peak hour	Guidance from Institution of Highways and Transportation 1994[191] refers primarily to traffic impact as a result of permanent development sites. The guidance sets out thresholds which, if exceeded, may trigger the need for a Traffic Impact Assessment (TIA)
Traffic related air quality and noise	Potentially significant impact if : • traffic flows or HGV flows increase by 30% or more • traffic or HGV flows increase by 10% or more (where sensitive receptors present)	Guidance from IEMA (1993)[192] on scope for environmental impacts from traffic flow changes for new development
Traffic related noise	Potentially significant where traffic flows increase by 25% or more or decrease by 20% or more	Guidance in Design Manual for roads and Bridges Volume 11: Environmental Assessment[193]

Throughout the assessment of the effects of disruption due to construction, it has been assumed that the construction period would last for approximately 18 – 24 months (with a potential start of 2009) and that construction at the principal construction areas would be undertaken concurrently. The eventual contractor could choose to phase construction of the works. This assessment has assumed a worst case approach with construction activities throughout the works area occurring at the same time.

13.6 CONSTRUCTION PROPOSALS

13.6.1 Introduction

The scheme would most likely be procured by means of a Design and Build contract (see Section 3.3.2). The details presented in this chapter on construction and used for the assessment are based on the current scheme design and assumptions about how the scheme would be built. Details of construction methods would be determined by the successful contractor when the detailed scheme design is finalised.

13.6.2 Construction Activities

For the purposes of this assessment it has been assumed that all construction activities and storage of materials would be carried out within the land acquired for the scheme. The principal construction activities which could give rise to disruption are:

- construction of the dual carriageway and associated junctions;
- construction of highway related structures (bridges etc);

[191] Institution of Highways and Transportation (1994) Traffic Impact Assessment Guildelines
[192] Institute of Environmental Assessment (1993) Guidelines for the Environmental Assessment of Road Traffic, Guidance Notes No. 1
[193] Department of Transport *et al* (1993 and updates) Design Manual for Roads and Bridges, Volume 11: Environmental Assessment, HMSO

- drainage measures, including culverts; and
- construction of temporary diversions.

The main works area along the route of the new dual carriageway would cross over existing roads in the local network and also the A90 north of the existing roads in the local network and also the A90 north of the existing A975 junctions. At these locations the contractor would be required to provide continued access for local users at all times and, where necessary, construct localised temporary diversions. Temporary traffic signals might be appropriate in order to ensure safe passage of public and site traffic at such locations. Such measures would not however be permitted if they resulted in significant queues to road users.

The locations where the main construction activities take place in proximity to local roads are shown in Figure 13.1.

13.6.3 Construction Traffic

Increase in HGV numbers using the existing network to access construction areas also have potential to cause disruption (see Section 13.7). Key activities which would give rise to traffic include:

- import or disposal of cut and fill materials;
- steel and concrete import for major structures; and
- road pavement materials.

Assumed construction traffic generation is listed in Table 13.3. It is assumed that the additional car journeys generated by construction staff would not be significant in terms of disruption.

Table 13.3 Assumed Construction Traffic Generation

Activity	Approximate Quantity of Material for Transportation	Approximate Number of HGV Movements Generated.
Transport of soils on A90 from Balmedie south to works areas further north	170,000m^3	17,000
Import of concrete for structures	10,000m^3 concrete	1,600
Import of steel for structures	3,000 tonnes	300
Import of road pavement products	100,000m^3	10,000
TOTAL HGVs		28,900

[1] 1. Estimates of HGV volumes are based on the following assumptions:
a) 10m^3 of soil / topsoil material per load
b) 6 m^3 of concrete per load
c) 10 tonnes of steel per load
d) 10 m^3 of road pavement product per load
2. A worst case assumption has been made that there is no back loading for vehicles. A movement therefore represents two journeys – to and from the point of delivery

It has been assumed that the A90, B977, A975 and B9000 would be the routes used for the delivery of materials.

13.7 POTENTIAL IMPACTS

13.7.1 Construction

- Disruption to local and commuting traffic and an increase in journey times is likely to occur during the scheme construction. The roads which potentially would be most likely to be affected by construction would include:

    - the existing A90;
    - the B977 linking the A90 with Belhelvie;
    - the A975 linking the A90 to Newburgh;
    - the B9000 to Newburgh and west to Pitmedden; and
    - local roads linking the scattered settlements in the scheme area;

- effects of special loads on the existing road network; and
- cumulative effects on local roads if other major construction projects were programmed for the same time and the proposals.

13.8 MITIGATION MEASURES

DDC1. The contractor would be required to ensure that vehicles on the existing A90, B977, A975 and B9000 and other side roads were safely routed through construction areas and to ensure that works were planned to limit the risk of disruption taking account of any other ongoing construction activities in the area.

DDC2. Information would be given during the life of the contract to warn drivers in advance about the presence of queues and the anticipated delay to journeys as a result. This would be via radio station traffic updates and bulletins. Queue lengths would be checked during construction activities requiring contraflows and the information used to inform traffic information outlets including the Traffic Scotland signs in the wider road network.

DDC3. Effective liaison by the contractor with the communities close to the construction areas would be maintained. This would include circulation of information about ongoing activities and a contact telephone number for use by the local community to contact the contractor for information. The telephone would be attended during all operational hours and the person(s) with the appropriate authority to resolve any problems that occur would be available. A log of all complaints and actions taken would be available for inspection.

DDC4. The contractor would be required to consider potential traffic and transport related effects as part of all relevant method statements and to include appropriate mitigation measures for all activities where the potential for significant effects was identified.

DDC5. Any complaints from the public would be followed up immediately and wherever feasible mitigation measures identified and implemented to ensure that complaints in the future were eliminated.

DDC6. The contractor would be required to comply with all contract requirements regarding access and to consult with Aberdeenshire Council Roads Department on all proposed traffic control measures on access routes and in advance of movement of any heavy loads.

DDC7. All construction traffic HGV drivers would be briefed on the importance of observing speed limits, in particular through residential areas.

DDC8. All HGV drivers would be briefed on the importance of allowing traffic to pass safely and not causing an obstruction to other road users.
DDC9. The contractor would be encouraged to establish haul roads, internal to the scheme, as early in the contract as possible to reduce the effects of construction traffic on the local road scheme.
DDC10. Access to all properties would be maintained and all necessary diversion routes would be clearly signed.

13.9 ASSESSMENT OF RESIDUAL EFFECTS

13.9.1 Construction

The activities shown in Table 13.3 would occur throughout the construction period over 18-24 months. The daily average for HGV movements would therefore be in the order of 80 movements per day. A worst case assumption would be that all HGVs approach on the A90 from the south. In this scenario the increase in HGVs on the A90 past Balmedie would equate to a 6% increase, which is not considered to be significant in terms of the criteria in Table 13.1 (the daily flow of HGVs is 2,600 in 2010 at this location). Elsewhere the effects would be less in terms of volume of HGV movements on the local road network.

The activities shown on Figure 13.1 would be accessed from agreed points in the local road network (in agreement with Aberdeenshire Council as local roads authority). The contractor would be likely to programme the works such that the off-road haul route was created as soon as possible following the construction of side road bridges and that soils could be transported between cut and fill areas without the need to access the public road system.

There would be some residual disruption as a result of scheme construction even with implementation of committed mitigation measures. The level of disruption would depend on the detailed methods used by the contractor. Key areas which would be affected are:

- at Balmedie south junction where the temporary closure of right turns into and out of Eigie Road would result in some local traffic diverting via the junction to the north of the village. It has been assumed this diversion would be in place for 12 weeks;
- the South Orrock access and the unclassified road at Dambrae where a temporary diversions would be constructed since new structures to provide permanent access over / under the new dual carriageway would be provided on the line of the existing roads at these locations;
- tie-ins to the existing dual carriageway north of Balmedie and south of Tipperty.

13.10 SUMMARY

- The increase in traffic on the local network during the period of construction likely to generate most movements (earthworks) would not be significant.
- Disruption to traffic would cause an increase in journey times at some stages of scheme construction such as during the tie-ins of the existing and new dual carriageways when contraflow working could be required.
- Construction activities and storage of materials would be carried out within the land acquired for the scheme.

- Use of haul roads internal to the site would be maximised which would reduce the impact of construction traffic on the local road network.
- Traffic management proposals would be developed by the contractor to minimise impacts.
- Some local roads would require to be diverted locally to allow construction. These would be clearly signed and access to all properties would be maintained.

14 NOISE AND VIBRATION

14.1 INTRODUCTION

This chapter considers the noise and vibration effects of the proposed scheme. The aspects of the scheme that could give rise to noise and vibration impacts are the changes to the existing noise and vibration climate due to the operation of the proposed scheme, and the noise impacts associated construction works including construction traffic, and anticipated traffic diversions.

The assessment of road traffic noise and vibration changes has been completed in accordance with the Stage 3 assessment methodology presented in The DMRB Volume 11, Section 3, Part 7 Traffic Noise and Vibration. This assessment addresses the change in road traffic noise levels likely to be experienced by local receptors for the "Do Something" (DS) scenario (e.g. with the scheme in place) for both the year of opening (2010) and the scheme design year (2025). Comparisons are drawn against the "Do Minimum"[194] (DM) scenario (see Section 4.2) in both cases. The assessment includes an appraisal of change in noise nuisance[195] (see Sections 14.8.3.5 and 14.8.3.6) as a result of the proposed scheme.

In accordance with the requirements for a DMRB Stage 3 Assessment of Disruption Due to Construction, as documented in Volume 11, Section 3, Part 3, consideration has been given to the potential for noise impact from construction works (see also Chapter 13). A series of construction noise level predictions have been undertaken for key areas where there is the potential for noise impact. The predicted noise levels have been compared with published guidance for construction sites.

This chapter is necessarily technical in nature and contains a certain amount of terminology relating to noise and vibration. The terminology used in this chapter is defined and explained in Appendix 14.1.

14.1.1 Interpreting Noise

Noise is defined as unwanted sound. The human ear is able to respond to sound in the frequency range 20 Hz (deep bass) to 20 kHz (high treble) and over the audible range of 0dB (the threshold of perception) to 120dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting (filtering) mechanism is used. This reduces the importance of lower and higher frequencies, approximating the response of the human ear.

The weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement and the levels are denoted as dB(A) or L_{Aeq}, L_{A10}, etc, according to the parameter being measured.

[194] The Aberdeen Western Peripheral Route (AWPR) is proposed to open in 2012, accordingly, only traffic flow data for years greater than or equal to 2012 include the affect of this proposed scheme

[195] 'Noise Nuisance' is defined by the World Health Organisation as "*a feeling of displeasure evoked by noise*". This definition is referenced within the DMRB

The perception of noise may also be determined by a number of other factors, which may not necessarily be acoustic. Noise can be perceived to be louder or more noticeable if the source of the noise is observed, for example roads, trains, factories, building sites etc. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features[196] such as tonality may be important, as may be the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

Various noise indices have been derived to describe the fluctuation of noise levels that vary over time. Usually, these noise indices relate to specific types of noise, and as such different noise indices are used to describe road traffic noise, background noise, construction noise, etc.

The standard noise index used to describe road traffic noise in the UK is the $L_{A10\ 18hour}$, which is defined as the arithmetic average of 18 $L_{A10\ 1hour}$ levels between 06:00 and 24:00 hours. The $L_{A10\ 1hour}$ level, is the noise level that is exceeded for 10% of the time during the hour in question. The $L_{A10\ 1hour}$ index is also used to described road traffic, often during the peak hour when traffic volumes are at their highest.

The standard noise index used to describe background noise is the $L_{A90,T}$, which is defined as the noise level that is exceeded for 90% of the time during the specified period T.

The standard noise index used to describe construction site noise is the $L_{Aeq,T}$, the equivalent continuous noise level. This can be defined as the level of a notional steady sound that, if continued over the time period (T), would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded during that same time period.

The decibel scale is logarithmic rather than linear. As a result of this, a 3dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3dB(A) is generally regarded as the minimum change in noise level that is perceptible under normal conditions, assuming a similar spectral and temporal nature. Table 14.1 demonstrates a few examples of noise levels typically experienced during everyday activities.

Table 14.1: Typical Sound Levels Found in the Environment

Sound Level	Location
0 to 10dB(A)	Threshold of hearing
10 to 30dB(A)	Broadcasting studio
30 to 40dB(A)	Quiet bedroom
40 to 50dB(A)	Typical office
50 to 60dB(A)	Busy office
60 to 70dB(A)	Typical high street

[196] E.g. whether the noise contains particular discrete tones or pitches (noises such as whines, hisses, screeches and hums)

Sound Level	Location
70 to 80dB(A)	Passenger car or light van at 60km/h and 7metres
80 to 90dB(A)	Heavy diesel lorry at 40km/h and 7m or twin engine modern jet during take off at 152m
90 to 100dB(A)	Pneumatic drill (unsilenced) at 7m
120dB(A)	Threshold of pain

14.1.2 Interpreting Vibration

Vibration is defined as a repetitive oscillatory motion. Groundborne vibration can be transmitted to the human body through the supporting surfaces; the feet of a standing person, the buttocks, back and feet of a seated person or the supporting area of a recumbent person. In most situations, entry into the human body will be through the supporting ground or through the supporting floors of a building.

Vibration from road traffic can also be airborne. Such airborne vibration is transmitted as a low-frequency sound wave and is often perceived when the sound wave causes windows or other objects to rattle.

Vibration is often complex, containing many frequencies, occurring in many directions and changing over time. There are many factors that influence human response to vibration. Physical factors include vibration magnitude, vibration frequency, vibration axis, duration, point of entry into the human body and posture of the human body. Other factors include the exposed persons experience, expectation, arousal and activity.

Experience shows that disturbance or annoyance from vibration in residential situations is likely to arise when the magnitude of vibration is only slightly in excess of the threshold of perception.

The threshold of perception depends on the frequency of vibration. The human body is most sensitive to vibration in the frequency range 1 to 80Hz and especially sensitive to vibration in the range 4 to 8Hz. As with noise, a frequency weighting mechanism is used to quantify vibration in a way that best corresponds to the frequency response of the human body. For occupants within buildings, the frequency weighting curve is defined in British Standard (BS) 6472: 1992 '*Evaluation of human exposure to vibration in buildings*'. Volume 11, Section 3, Part 7, Chapter 6 of the *Design Manual for Roads and Bridges*, defines traffic vibration as 'a low frequency disturbance producing physical movement in buildings and their occupants', and goes on to state that vibration can be transmitted through both ground and the air and provides a summary of studies pertinent to the subject. In general, vibration is only perceptible in residential situations when the building is close to a railway, construction site or very close to a road that carries large and heavy vehicles.

14.2 SOURCES OF INFORMATION

14.2.1 Significance Criteria

The DMRB does not present guidance on assessing the significance of noise effects. It is therefore necessary to draw on other guidance and best practice. Whilst the *Guidelines for Environmental Noise Impact Assessment* produced by the joint working party of the Institute of Acoustics (IOA) and Institute of Environmental Management and Assessment (IEMA) is only draft at this stage, the content is of assistance when establishing the significance of noise impacts.

This guidance presents an example of how changes in noise level can be categorised by significance, based on key benchmarks that relate to human perception of sound. These benchmarks include a 3dB change, which is generally considered to be the smallest change in noise that is perceptible for sounds of similar spectral content, and a 10dB change, which represents a doubling or halving of the noise level.

Although 3dB is commonly considered to be the smallest perceptible change in noise level, for sounds of similar properties, the DMRB states that "*people are more sensitive to abrupt changes in traffic noise associated with new road schemes than would be predicted from steady state evidence. In the period following a change in noise traffic flow, people may find benefits or disbenefits when the noise changes are as small as 1dB(A)*".

The IOA/IEMA guidance goes on to state that in any assessment the noise level threshold and significance statement should be determined by the assessor, based upon the specific evidence and likely subjective response to the noise. Accordingly, it is necessary to consider the sensitivity of the receptor, the predicted noise levels and the magnitude of the predicted noise level change. Table 14.2 below presents the criteria used to define the sensitivity of receptors.

Table 14.2: Criteria Used to Define Sensitivity of Receptors

Sensitivity	Description	Example Receptors
High	Receptors where people or operations are particularly sensitive to noise	Residential dwellings Quiet outdoor areas used for recreation Conference facilities Auditoria/studios Schools in the daytime Hospitals/residential care homes
Medium	Receptors moderately sensitive to noise where it may cause some distraction or disturbance	Offices Restaurants Scheduled Ancient Monuments/Listed Buildings
Low	Receptors where distraction or disturbance from noise is minimal	Factories Commercial Installations Storage centres Industrial sites

The magnitude of noise impacts has been assessed by categorisation of the predicted noise level changes in accordance with Table 14.3 below:

Table 14.3: Criteria Used to Define Magnitude of Noise Level Changes

Magnitude of Impact	Change in noise level
No Impact	0 to 0.9dB
Negligible	1 to 2.9dB
Low	3 to 4.9dB
Medium	5 to 9.9dB
High	> 10dB

The significance of noise impacts has been determined according to the following impact matrix presented in Table 14.4.

Table 14.4: Noise Impact Significance Matrix

Magnitude (Table 14.3)	Sensitivity (Table 14.2)		
	Low	**Medium**	**High**
No Impact	None	None	None
Negligible	None	None	Minor
Low	None	Minor	Moderate
Medium	Minor	Moderate	Major
High	Moderate	Major	Major

Effects have been categorised as adverse where noise level increases have been identified and beneficial where noise level decreases have been identified.

Environmental Assessment, Section 3, Environmental Assessment Techniques, Part 7: Traffic Noise and Vibration
This section of the DMRB documents a method of appraisal for the assessment of noise and vibration impacts from proposed new or altered highways. The presented methodology follows a three stage approach, with each stage subject to an increased level of detail over the previous stage.

An assessment in accordance with the final Stage 3 requires that:

- a noise assessment be undertaken for all properties and other relevant locations (for example, sports fields, canals, footpaths etc) where existing traffic is likely to be increased by at least 25% or reduced by at least 20%;
- predicted noise level changes be identified and presented on plans showing the effects at key and typical sites after taking account of proposed mitigation measures;
- appropriate noise mitigation methods be identified to reduce the impacts of any adverse effects;
- a noise nuisance assessment be undertaken for properties subject to noise level changes of 1dB(A) or more;
- statements be made on ambient and predicted noise levels for all properties and other relevant locations;
- an indication of the number of properties which are likely to be eligible for statutory noise insulation under the requirements of the Noise Insulation (Scotland) Regulations be identified; and
- an assessment of traffic induced vibration impact be undertaken.

The Calculation of Road Traffic Noise Memorandum (CRTN)
CRTN, published in 1988 by the then Department of Transport and the Welsh Office, sets out standard procedures for calculating noise levels from road traffic. The calculation methods use a number of input variables, including traffic flow volume, average vehicle speed, percentage of heavy goods vehicles (HGVs), type of road, site geometry and the presence of noise barriers or acoustically absorbent ground. CRTN predicts the $L_{A10\ 18hour}$ or $L_{A10\ 1hour}$ noise level for any receptor point at a given distance from the road.

CRTN also documents procedures for the measurement of road traffic noise. Three methods of road traffic noise measurement are described, the first entitled 'The Measurement Method', for direct measurement of the $L_{A10\ 18hour}$ noise level, the second entitled the 'Shortened Measurement Procedure', for measurement of

the $L_{A10\ 3hour}$ noise level (from which the $L_{A10\ 18hour}$ level can be derived) and the third entitled 'Comparative Measurements' which is a procedure to establish noise levels from a single road traffic route at various points, provided that the route remains the dominant source. CRTN states that if the Shortened Measurement Procedure is followed, a correction of -1dB can be applied to approximate the $L_{A10\ 18hour}$ noise level.

The Noise Insulation (Scotland) Regulations 1975 (NISR)
This document provides for noise insulation to be offered in respect of residential properties affected by noise from new or altered roads. The qualifying criteria are detailed within the Regulations and within the Memorandum on the Noise Insulation (Scotland) Regulations 1975 (NISR), regulations 3 and 6: The qualifying criteria are as follows:

- the properties are situated within 300m of the new or altered carriageway;
- the properties lie within the triangular area at the terminal point of the new highway, the apexes of which are 50m along the centre-line of the existing highway from the terminal points and the bases of which extend from points 300m on either side of the highway to the nearest point on the carriageway at right angles to the centre line of the carriageway;
- a straight line can be drawn from any point of the property to a point on the carriageway without passing through another building;
- the use of the highway causes or is expected to cause noise at a level not less than 68dB(A); and
- the property will experience noise levels exceeding the 'prevailing noise level' by at least 1.0dB(A).

The road traffic noise prediction method detailed within the Memorandum has been improved over the years and the present methodology contained within CRTN is more accurate and detailed. While DMRB does allow the use of the method detailed within the Memorandum, the predictive tool employed in this assessment is CadnaA which uses the predictive methods set out in CRTN to calculate noise levels. While the CRTN methodology is more detailed and accurate than that contained within the Memorandum, the NISR strictly requires that eligibility be assessed in terms of the Memorandum methodology. Therefore, the assessment presented later in this chapter can only be taken as providing an indication of the properties which are likely to be eligible for statutory noise insulation.

BS5228: Noise and Vibration Control on Construction and Open Sites (Part 1 1997 & Part 4 1992)
This standard sets out techniques to predict the likely noise and vibration effects from construction works, based on detailed information on the type and number of plant being used, their location and the length of time they are in operation.

The noise prediction method is used to establish likely noise levels in terms of the $L_{Aeq,T}$ over the core working day. For the purpose of this assessment, it is assumed that the core working day would be the 10-hours between 08:00 and 19:00, with a 1-hour break for lunch Monday to Friday and 08:00 to 13:00 hours on Saturdays.

This standard also documents a database of information, including previously measured sound power levels for a variety of different construction plant

undertaking various common activities. The Department for Environment, Food and Rural Affairs (Defra) commissioned Hepworth Acoustics Ltd to undertake an update of the database, with the results of this update published in December 2004 in the Defra publication *Update of noise database for prediction of noise on construction and open sites*. However, the published results have not been formally adopted into the British Standard publication and as such, the assessment presented in this chapter uses the source sound power levels contained in BS5228. Notwithstanding this, it should be noted that in general terms, the updated noise levels are lower than those presented in BS5228 Part 1, reflecting advances in engine technology. Accordingly, the completed assessments can be considered worst case.

Advice Leaflet (AL) 72 - Noise Control on Building Sites (1976)
Whilst AL72 is out of print, it does present useful guidance on acceptable noise levels from construction sites. These limits are presented according to the nature of the surrounding environment, for a 12-hour working day. The limits are:

- 70.0dB(A) in rural, suburban and urban areas away from main road traffic and industrial noise; and
- 75.0dB(A) in urban areas near main roads and heavy industrial areas.

Given that the site is located in largely rural area, it is proposed to assess the construction works against a core working daytime (10-hour) noise level criterion of 70dB $L_{Aeq,T}$. Applying this criteria to a shorter daytime period (e.g. 10 hours rather than 12), ensures a more stringent assessment. This approach has been agreed during consultation with the Local Authority.

14.3 CONSULTATIONS

At Stage 1 of the noise and vibration assessment, the DMRB states that the assessor should: "*contact the Local Authority Environmental Health Officers for any information about existing noise nuisance, either from road traffic or other sources such as industry or quarries. Also, obtain any noise constraints arising from Local Plans*". There are no specific consultation requirements defined at Stages 2 or 3, therefore the Stage 1 consultation was completed.

The Local Authority Environmental Health Department for the Formartine region of Aberdeenshire was consulted and requested to provide any relevant information on existing noise nuisance and noise constraints arising from Local Plans.

The consultation response identified that whilst there are a number of industrial / commercial installations along the route corridor that have the potential to cause noise nuisance, (i.e. a monumental stonemason business, an engineering/ fabrication business at Rashierieve, see Section 6.4.7, and a proposed sand and gravel quarry at South Orrock, Balmedie, see Section 5.6), no noise nuisance complaints have been received from these premises.

Other relevant information included that the monumental stonemasons are subject to planning conditions regarding noise emissions and that if approved, the quarry would also be subject to noise related planning conditions. The Aberdeenshire Local Plan, adopted on the 30th June 2006 does not include any noise constraints specific to this proposed development.

A review of this document identified that there is specific reference to noise within its infrastructure section, but only with respect to renewable energy facilities. The section and policy (Policy Inf\1) pertinent to roads and access does not include specific reference to noise, but does state that "*A new road or other access will be approved, in principle, if… it is designed to be safe…..and cause minimal impact on the character of the site and surrounding area….*"

As noted above, the 70dB core working daytime criterion adopted in the construction noise assessment was agreed during consultation with the Local Authority.

14.4 BASELINE

14.4.1 Study Area

It is anticipated that effects from the proposed development would result from the introduction of new noise sources (e.g. the new road and associated junctions), the realignment of existing noise sources (e.g. necessary local road improvements/updates), and any significant changes in flows along the existing A90 route corridor. In addition, it is anticipated that other local road traffic routes not subject to re-alignment may also be subject to significant traffic flow changes.

The study area has been divided into the Core Study Area, and the Wider Study Area. The Core Study Area has been defined as the region within 300m of:

- any proposed new road traffic route, including both the proposed A90 and other local routes;
- any local road traffic route subject to realignment, including vertical realignment; and
- the existing A90 route corridor.

The Core Study Area has been defined based on a starting point on the A90, adjacent to South Folds in the south, and a finishing point in the north adjacent to Tipperty at the point where the proposed new route rejoins the existing route.

The Wider Study Area has been defined by receptors immediately fronting any unaltered road, not already within the Core Study Area and predicted to be subject to a traffic flow increase of 25% or greater, or traffic flow decrease of 20% or greater, as a result of the scheme in the opening year (2010).

The Core Study Area and Wider Study Area are shown on Figure 14.1a-b.

14.4.2 Sensitive Receptors

The DMRB provides guidance on the receptor types that should be considered in the example Noise Assessment Summary Table (Ref. Table 1 in DMRB Volume 11 Section 3 Part 7), which includes columns corresponding to residential properties, commercial properties, industrial properties, and community facilities. The Stage 3 assessment also states that the noise assessment should be undertaken for *"all properties and other relevant locations (for example sports fields, canals, footpaths).*

In the case of this development, the study area is primarily rural and as such, the majority of receptors are residential dwellings, with relatively few industrial and commercial installations. Accordingly, the receptors have been categorised as

residential, commercial/industrial and community facilities. A summary of the receptors within the Core Study Area is presented in Table 14.5.

In recognition of concerns that Historic Scotland have towards noise level changes at Scheduled Ancient Monuments (SAM) and Listed Buildings (LB), consideration has been given to the effect of noise level changes at the following sites:

- Temple Stones (SAM);
- Hare Cairn (SAM);
- Balmedie Lodge (LB);
- Balmedie House (LB);
- Orrock House Dovecot (LB);
- Orrock House (LB);
- Belhelvie Old Parish Church (LB);
- Menie House (LB);
- Menie Lodge (LB); and
- Mill of Foveran (LB).

Of the above, all except Temple Stones, Balmedie House, Orrock House Dovecot and Menie House fall within the Core Study Area (see Section 12.4). Those within the Core Study Area have been included as receptors within the Community Facilities category as summarised below.

There are many local tracks and informal paths that are openly accessible to the general public, each of which may be used in varying regularity, and many of which did not appear to be in regular use for social enjoyment (see Section 6.4.4). In addition, over the length of each track or path, the distance from local noise sources varies, which makes their classification according to ambient noise level inherently difficult. For the purpose of this assessment, these paths have not been considered as individual receptors such that the assessment is primarily based on residential receptors.

Table 14.5: Summary of Receptors Located Within the Core Study Area.

Category	Receptors
Residential	Dwellings within Balmedie Dwellings in Foveran Dwellings in Tipperty Various dwellings and farms within 300m of the existing and proposed route corridor, including those at Wester Hatton, Eastern Hatton, Hatton of Millden, Millden, South Folds, The Holdings, Drumhead, Keir, South Orrock, Orrock, Damhead, North Orrock, Boghead, Hill of Menie, Hill of Menie Croft, Wardhead, Seven Acres, Dambrae, Stoneyards, Cowhill, Bog Roy. Aikenshill, Kirkhill, Rashiereive, Overhill, Blairythan, Oldmill Croft, Westfield, Kincraig, East Pitmillan, Fountainbleau, South Farden, Bridge-end, Jaswood, Balmedie Garden Centre (disused), Blairton, the Cock and Bull Public House, Sidney Cottage, Manse, Mill of Blairton, Seaview, Pettens, West Lodge Menie, Summerlee, Delfrigs, Newtyle, Dykenook, Mains of Newtyle, Southlea, Cairneylaw, Newtyle Croft, Mill of Foveran, Oldmill Croft, Pitmillan, Fornety, Tipperty Industrial Estate

Category	Receptors
Commercial / Industrial	Balmedie Garden Centre (disused) Pitmillan Piggery Bon Accord Granite Centre (Rashierieve) Car Dealership (Rashierieve) Steel Rendering Yard (Rashierieve) Tipperty Industrial Estate Victoria Hall Car Dealership (Drumhead) The White Horse Accommodation Block Wester Hatton Timber Yard Easter Hatton Land Fill Site
Community Facilities	Playgrounds at Balmedie Balmedie Post Office Belhelvie Church Belhelvie Church Hall Church Remains South of Pettens The Cock and Bull Public House Foveran Hall Foveran School East Aberdeenshire Golf Course East Aberdeenshire Golf Course Club House Balmedie Pet Cemetery White Horse Hotel (Balmedie) Foveran playing field Hare Cairn (SAM) Belhelvie Old Parish Church (LB) Balmedie Lodge (LB) Orrock House (LB) Menie Lodge (LB) Mill of Foveran (LB)

14.4.3 Baseline Noise Survey

A baseline noise survey was undertaken in March 2006 over the course of an approximate 72 hours period to establish the existing noise climate in the vicinity of the study area. The aim of the survey was to establish the existing noise climate at a sample of locations considered representative of local receptors, particularly those which could be subject to significant noise level changes (increases and decreases) as a result of the proposed development.

The noise survey commenced at approximately 19:00 hours on Monday the 27th March 2006, concluding at approximately 11:15 hours on Thursday the 30th March.

Detail on the noise measurement equipment used during the survey, the adopted noise survey methodology and the selection of measurement locations is included in Appendix 14.2.

The survey comprised a combination of continuous measurements over extended periods (up to 24 hours) subject to periods of attendance, and fully attended short-term measurements. Short-term attended measurements comprised a combination of 3-hour road traffic noise measurements undertaken in the accordance with the shortened measurement procedure presented in CRTN, and a series of 15 minute measurements spread over 18-hour daytime periods. In the most part, 3-hour measurements were undertaken at positions in close vicinity to existing road traffic routes (within 15m) with 15 minute measurements undertaken at locations removed from existing road traffic routes.

The attended measurements allowed the noise environment to be experienced first hand and dominant noise sources noted.

The measurement locations adopted during the survey, were as follows:

- **Measurement Location 1**, located in the Belhelvie Church Car Park, approximately 5m from the B977. Measurement considered representative of Belhelvie Church and other local dwellings in Drumhead (see Photograph 6). This location was subject to a series of short term free-field measurements under free-field conditions;
- **Measurement Location 2**, located to the side of a narrow track leading to South Orrock, approximately 230m west of the A90 and considered representative of dwellings at South Orrock and Orrock House. This location was subject to a continuous noise measurement for a 24 hour period under free-field conditions;
- **Measurement Location 3**, located at approximately 2m from the local road leading to Seven Acres and 640m from the A90 and considered representative of local dwellings at Seven Acres, Wardhead, Cowhill and Stone Yards, and the Pet Cemetery. This location was subject to a series of short term 15 minute measurements under free-field conditions;
- **Measurement Location 4**, located adjacent to the local road leading to Seven Acres, at a distance of approximately 4m, and 200m from the A90 and considered representative of the dwellings at Dambrae. This measurement location was subject to a series of short term 15 minute measurements under free-field conditions;
- **Measurement Location 5**, located at the side of an access road leading to Aikenshill, approximately 220m from the A90 and considered representative of Aikenshill Cottages and farm house. This measurement location was subject to a series of short term 15 minute measurements under free-field conditions;
- **Measurement Location 6**, at the front of Mains of Newtyle, a derelict farm house, adjacent to the minor road leading to Drums, approximately 360m from the A90. This location was subject to a series of short term 15 minute measurements under free-field conditions;
- **Measurement Location 7**, at the start of the access drive to Blair Lodge, a farm house, approximately 520m west of the A90, on the local road to Overhill. This measurement location was considered representative of dwellings at Kirkhill, Blair Lodge and Overhill, and was subject to a series of short term 15 minute measurements under free-field conditions;
- **Measurement Location 8**, adjacent to a large barn and opposite a bungalow on the local minor road leading to Mill of Foveran, approximately 310m from the A90. This measurement location was subject to a series of short term 15 minute measurements under free-field conditions;
- **Measurement Location 9**, at the bottom of the access road to the Piggery at Pitmillan, at a distance of approximately 400m from the A90. This location was subject to a series of short term 15 minute measurements under free-field conditions;
- **Measurement Location 10**, located adjacent to the access drive to dwellings at Southfolds, approximately 8m from the A90, considered representative of dwellings at Southfolds, in the vicinity of the proposed Balmedie Junction. This location was subject to a continuous noise measurement for a 22 hour period under free-field conditions;

- **Measurement Location 11**, towards the northern end of Balmedie town, at the end of a dead end track, opposite the junction with the road to Drumhead, approximately 10m east of the A90. This location was subject to a continuous 3 hour road traffic noise measurement under free-field conditions;
- **Measurement Location 12**, in the car park at The Cock and Bull Public House, approximately 13m from the A90, considered representative of this property. This location was subject to a continuous 3 hour road traffic noise measurement under free-field conditions;
- **Measurement Location 13**, approximately 7m east of the A90 and 250m north of the junction with the A975 Newburgh Road. This location was positioned within the derelict roofless buildings at Cairneylaw, and elevated to a height of approximately 3.5m such that there was a clear line of sight to the A90. This location was considered representative of dwellings fronting the A90 at the junction of the A90 and the A975 and was subject to a continuous noise measurement for a 24 hour period under free-field conditions;
- **Measurement Location 14**, located approximately 8m from the A90, at the eastern end of the Foveran Playing Field, considered representative of the playing field, Foveran Primary School and local dwellings. This location was subject to a continuous 3 hour road traffic noise measurement under free-field conditions;
- **Measurement Location 15**, approximately 75m west of the A90 and 450m south of the junction with the B9000, considered representative of dwellings at West Pitmillan and Fountainbleau. This location was subject to a continuous noise measurement for a 23 hour period under free-field conditions;
- **Measurement Location 16**, located at 4.5m from Eigie Road, the road through Balmedie, opposite Eigie Crescent and adjacent to the leisure centre. This measurement location was subject to a continuous 3 hour road traffic noise measurement under free-field conditions; and
- **Measurement Location 17**, located on a grassy verge, next to an access road to a local garage, approximately 12m from the B9000 leading to Newburgh. This location was subject to a continuous 3 hour road traffic noise measurement under free-field conditions.

The above measurement locations can be seen in Figure 14.2a-b.

Table 14.6, summarises the noise environment at each measurement location as observed during the noise survey.

Table 14.6: Observed Local Noise Environment During the Noise Survey

Measurement Location	Local Noise Environment
1	Isolated road traffic pass-bys on the adjacent B977, and natural sources such as bird song. Additional sources include distant contribution from the A90, and occasional contribution from helicopter pass-bys
2	Distant road traffic on the A90 and occasional contribution from helicopter pass-bys
3	Isolated road traffic pass-bys on the adjacent local road. Additional sources include distant contribution from the A90, and occasional contribution from helicopter pass-bys
4	Distant road traffic on the A90 and isolated road traffic pass-bys on the adjacent local road. Additional sources include occasional contribution from helicopter pass-bys

Measurement Location	Local Noise Environment
5	Distant road traffic on the A90 and isolated road traffic pass0bys on the adjacent local road. Additional sources include occasional contribution from helicopter pass-bys
6	Distant road traffic on the A90 and isolated road traffic pass0bys on the adjacent local road. Additional sources include occasional contribution from helicopter pass-bys
7	Isolated local road traffic pass-bys and distance road traffic from the A90
8	Isolated local road traffic pass-bys and distance road traffic from the A90
9	Road traffic on the A90. Additional sources include occasional contribution from helicopter pass-bys
10	Road traffic on the A90
11	Road traffic on the A90
12	Road traffic on the A90
13	Road traffic on the A90
14	Road traffic on the A90
15	Road traffic on the A90
16	Local road traffic and distant contribution from the A90
17	Local road traffic and distant contribution from the A90

It can be seen from the above table that the key local noise source across the study area was road traffic, in particular that travelling on the existing A90. Some locations were also subject to sporadic contribution from helicopter traffic.

The full tabulated noise measurement data can be seen in Appendix 14.2 and are summarised in Tables 14.7, 14.8 and 14.9 below.

The weather during the noise survey was largely conducive towards noise measurements, remaining mostly dry during the daytime with winds ranging from still to moderate/strong. Moderate/strong westerly winds were experienced during the daytime of the 29 March 2006. Whilst measurements continued during the period of increased wind speeds (so that the noise environment could be observed), the acquired measurement data has been eliminated from the summary noise level data presented in Tables 14.7, 14.8 and 14.9.

Table 14.7: Summary of Measured Daytime Noise Level Data for Locations Subject to Continuous Extended Monitoring Periods, Free-field, dB

Measurement Location	Noise Level Data		
	$L_{A10\ 18hour}$	$L_{Aeq\ 16hour}$	$L_{A90\ 16hour}$
2	54.6	53.8	46.7
10[1]	78.3	75.6	63.4
13	77.8	74.7	57.2
[1] Measurements do not include period from 18:00 to 20:00 hours, but considered representative of full period measurements			

Table 14.8: Summary of Measured Daytime Noise Level Data for Locations Subject to a Series of 15 Minute Attended Monitoring, Free-field, dB

Measurement Location	Noise Level Data		
	Calculated $L_{A10\ 18hour}$	Calculated $L_{Aeq\ 16hour}$[1]	Calculated $L_{A90\ 16hour}$
1	51.6	54.7	42.0
3	54.9	52.2	40.7
4	49.9	47.1	40.9

Measurement Location	Noise Level Data		
	Calculated $L_{A10\ 18hour}$	Calculated $L_{Aeq\ 16hour}$ [1]	Calculated $L_{A90\ 16hour}$
5	53.5	53.2	45.4
6	49.5	51.3	46.5
7	49.8	51.9	40.5
8	60.9	53.3	46.6
9	62.1	56.4	49.4

[1] Short term 15 minute measurements averaged to identified levels representative of 16 and 18 hour periods.
Statistical indices calculated by means of arithmetic averages, $L_{Aeq,T}$ levels calculated by means of logarithmic averages

Table 14.9: Summary of Measured Daytime Noise Level Data for Locations Subject to 3 Hour Road Traffic Noise Measurements, Free-field, dB

Measurement Location	Noise Level Data		
	Calculated $L_{A10\ 18hour}$ [1]	Calculated $L_{Aeq\ 16hour}$ [1]	Calculated $L_{A90\ 3hour}$
11	77.2	75.2	63.6
12	75.1	73.1	59.9
14	71.3	69.3	53.6
16	65.7	63.7	51.4
17	62.6	60.6	47.2

[1] $L_{A10\ 18hours}$ assumed to be 1dB lower than measured $L_{A10\ 3hour}$ noise level and $L_{Aeq\ 16hour}$ assumed to in 3dB lower than measured $L_{A10\ 3hours}$ based on corrections presented in CRTN and PPG 24
Statistical indices calculated by means of arithmetic averages, $L_{Aeq,T}$ levels calculated by means of logarithmic averages

14.4.4 Baseline Noise Modelling

The baseline noise survey documented above identified that the key local noise source across the study area is road traffic. Whilst some sporadic contribution was also noted from helicopter movements and other natural sources, discounting these from the baseline noise model has resulted in worst noise level changes being identified when comparing against noise levels predicted for future scenarios.

A detailed noise model was prepared using the CadnaA PC based noise modelling suite to establish a baseline noise climate for the full study area. This model used the following data:

- 1m ground contours for the region within approximately 700m either side of the existing A90 route corridor;
- 1m ground contour data for the area approximately between the existing A90 route corridor, Nether Minnes (north-west of Overhill) and Torrangin (south-west of East Aberdeenshire Golf Course);
- 5m ground contour data for the wider area;
- Ordnance Survey Master Map data for the study area and beyond, in particular the buildings layer;
- the results of the traffic study (see Chapter 4), in particular the traffic data, including traffic flows, percentage HGVs and route speeds; and
- an inspection of the local highways including road widths and carriageway formats.

For this assessment, the baseline has been taken as the year of opening Do Minimum Scenario (2010DM), such that where necessary, the effects of the scheme can be established without the effect of natural traffic growth anticipated to occur between the existing year and the year of opening.

The DMRB requires that predicted noise level changes be identified at key and typical sites after taking into account mitigation. The 2010DM noise model was used to predict the baseline ground and first floor noise levels at the 46 sample receptor locations as shown in Table 14.10 below. These data are also presented in map format in Figure 14.3.

Table 14.10: Modelled 2010DM Noise Levels at Representative Sample Receptors, Façade, dB(A)

Location Number	Receptor	2010DM Noise Level, $L_{A10\ 18hour}$	
		Ground Floor	First Floor
1	Wester Hatton Cottages	70.9	73.7
2	Jandel	60.0	61.6
3	Dwelling at South Folds	61.7	64.3
4	Dwelling in Balmedie (south)	60.9	62.6
5	Dwelling at The Holdings (west)	52.5	54.2
6	Dwelling at The Holdings (east)	76.6	78.3
7	Dwelling in Balmedie (west central)	57.8	59.8
8	Dwelling in Balmedie (western edge)	76.2	78.9
9	Dwellings at Kier	64.7	66.0
10	Dwelling in Balmedie (north central)	52.9	55.4
11	Drumhead Lodge	61.8	64.0
12	Dwelling in Drumhead	56.0	57.7
13	The Bungalow	71.0	73.5
14	Dwelling at North of Blairton	60.8	62.3
15	Dwellings at South Orrock	58.2	59.1
16	The Cock and Bull	74.2	76.5
17	Sidney Cottage	77.0	79.2
18	Dwellings at Orrock House	52.9	54.0
19	Pettens	58.8	60.6
20	Dwellings at Boghead	54.4	55.5
21	Hill of Menie Croft	55.0	56.5
22	Hill of Menie	73.3	75.7
23	Wardhead	52.4	53.7
24	Summerlee	60.7	62.0
25	Dambrae	60.2	61.8
26	Cowhill	49.9	51.1
27	Stoneyard Cottages	55.3	56.5
28	Dwelling at Delfrigs	76.9	79.2
29	Dwellings at Aikenshill	52.7	54.2
30	Dwellings at Newtyle	65.6	68.3
31	Dwellings at Rashiereive	73.9	76.0
32	Dwellings at Kirkhill	48.9	50.2
33	Dwellings at Newtyle Croft	67.5	69.7
34	Dwelling at Blairythan Smithy	77.2	79.1
35	Blairythan Cottages	78.4	80.0
36	Dwelling at Foveran	60.6	62.7

Location Number	Receptor	2010DM Noise Level, $L_{A10\ 18hour}$	
		Ground Floor	First Floor
37	Foveran School	71.2	73.7
38	Dwellings at Mill of Foveran	57.0	58.7
39	Westfield Cottage	60.6	61.3
40	Dwellings at Pitmillan	53.6	55.1
41	Dwelling at West Pitmillan	57.5	59.4
42	Fountainbleau	71.8	74.2
43	South Farden	60.6	62.7
44	Dwellings at Fornety	56.9	57.7
45	Dwelling at Bridgend (eastern edge)	69.7	72.0
46	Dwelling at Tipperty (central)	66.4	67.3

The individual receptor noise levels presented in Table 14.10 and those on which the following assessment is based, were all calculated to include the affect of 1st order reflections from reflective surfaces located beyond 1.1m from the recover point. A façade correction of +2.5dB[197] was then applied manually to all receptors points 1m from building structures, e.g. dwellings, churches, schools etc. A façade correction was not applied to free-field receptors such as playing-fields or the golf course.

The baseline noise model was also run on a 12.5m grid square for the entire study area, with a receptor height of 1.5m above ground. The resulting baseline noise map can be seen in Figure 14.4a-b. Unlike for the individual receptors noise level calculations, the noise maps did not include for the effect of reflections. This approach was taken to decease the computational time. The noise maps therefore represent free-field noise levels.

To check the accuracy of the noise model, predictions have been carried out for the measurement locations subject to 24 hour and 3 hour road traffic noise measurements. Table 14.11 below compares the measured noise levels with those predicted for the baseline 2010 scenario.

Table 14.11: Comparison of Measured and Predicted Baseline Noise Levels, Free-field, dB(A)

Measurement Location	$L_{A10\ 18hour}$ Noise Level		
	Measured	Predicted	Difference
11	77.2[1]	76.5	0.7
12	75.1[1]	76.3	-1.2
16	65.7[1]	63.9	1.8
17	62.6[1]	62.8	-0.2
2	54.6	58.4	-3.8
10	78.3	75.7	2.6
13	77.8	78.4	-0.6
[1] $L_{A10\ 18hour}$ noise level calculated by subtracting 1dB from measured $L_{A10\ 3hour}$ noise level, in accordance with correction presented in CRTN			

It can be seen from Table 14.11 above that the predicted noise levels are all within 3dB of the measured levels with the exception of Measurement Location 2. As such, the noise model is considered suitably accurate for the purpose of this assessment.

[197] Calculation of Road Traffic Noise 1988

14.4.5 Baseline Ambient Noise Band Classification and Noise Nuisance Assessment for the Core Study Area

The DMRB requires that noise-sensitive receptors be categorised into ambient noise bands of <50dB(A), 50 to <60dB(A), 60 to 70dB(A) and ≥70dB(A). A summary of the results of this categorisation is presented in Table 14.12 below for the baseline (2010DM) scenario. A façade correction of +2.5dB was applied to receptor positions 1m from buildings (e.g. dwellings and churches) prior to categorisation.

Table 14.12: Classification of Noise Sensitive Receptors in the Core Study Area According to Ambient Noise Bands for the Baseline (2010DM) Scenario.

Receptor Category	Ambient Noise Level Bands, dB(A), Façade			
	<50	50 to <60	60 to <70	≥70
Residential	5	296	172	55
Commercial / Industrial	0	2	4	4
Community Facilities	1	8	8	3

The DMRB also requires a noise nuisance assessment to be undertaken for receptors subject to a change of 1dB or greater, and provides guidance on noise nuisance in terms of the percentage of people that will be bothered "very much, or quite a lot" by noise. Two different methods of calculating noise nuisance / change in noise nuisance are presented. The first method addresses a 'steady state' situation where only gradual noise level changes are anticipated or have occurred, i.e. where traffic flows have increased gradually over time. For this situation, nuisance is identified from the steady state curve by the assessment of the measured or predicted ambient noise levels before and after the change has taken place. The associated change in noise nuisance is the difference between the two identified nuisance levels

The second method addresses the situation where a sudden noise level 'change' is anticipated or has occurred e.g. as a result of opening a new road scheme. For this situation, the predicted noise level change is compared against the abrupt curve to identify the associated change in noise nuisance. The final noise nuisance level is identified by applying this immediate change to the nuisance level identified using the steady state method immediately prior to the opening of the road.

To establish the baseline noise nuisance in the core study area, the state steady method has been adopted using the results of the baseline (2010DM) noise model. The resulting baseline noise nuisance is presented in Table 14.13 below. In accordance with the DMRB, The nuisance has been categorised into bands of 0 to <10%, 10 to <20%, 20 to<30%, 30 to 40% and ≥40 %.

Strictly the noise nuisance guidance presented in the DMRB is only applicable to residential dwellings, but this has also been applied to commercial and community facilities in the absence of any other guidance, and in the interest of completeness.

Table 14.13: Classification of Noise Sensitive Receptors in the Core Study Area According to Noise Nuisance for the Baseline (2010DM) Scenario.

Receptor Category	Estimation of People bothered very much or quite a lot by Traffic Noise.				
	0<10	10 to <20	20 to <30	30 to <40	≥40
Residential	195	196	69	31	37
Commercial / Industrial	1	3	2	1	3
Community Facilities	5	9	3	1	2

14.4.6 Baseline Vibration Assessment

The DMRB requires that a vibration assessment be undertaken "*where necessary*" and goes on to state that "*on average, traffic induced vibration is expected to affect a very small percentage of people at exposure levels below 58dB(A) and therefore zero percent should be assumed in these cases.*" For traffic noise levels greater than 58dB $L_{A10\ 18hour}$, the percentage of people bothered very much or quite a lot by airborne vibration is similar to that for noise nuisance, except it is lower by approximately 10% at all exposure levels. As several receptors are subject to noise levels above 58dB $L_{A10\ 18hour}$, it has been considered prudent to undertake a vibration assessment.

When using the DMRB Volume 11 to predict disturbance due to airborne vibration, only unscreened properties within 40m of the road should be considered.

Adopting this criterion, Table 14.14 presents the baseline (2010DM) airborne vibration nuisance for properties in the Core Study Area, that are within 40m of, and have an unscreened line of sight to local road traffic routes. The same percentage bands have been adopted as for the baseline noise nuisance assessment above.

Table 14.14: Classification of Sensitive Receptors in the Core Study Area According to Airborne Vibration Nuisance for the Baseline (2010DM) Scenario.

Receptor Category	Estimation of People bothered very much or quite a lot by Airborne Vibration.				
	0<10	10 to <20	20 to <30	30 to <40	≥40
Residential	7	12	9	19	21
Commercial / Industrial	0	0	1	1	2
Community Facilities	0	0	0	3	0

14.5 ASSESSMENT METHODOLOGY

The assessment of road traffic noise and vibration impacts has been undertaken in accordance with the Stage 3 Methodology outlined in the DMRB Volume 11, Section 3, Part 7. This methodology requires that an assessment be undertaken for all properties where existing traffic is likely to increase by 25% or decrease by 20% (equivalent to a change in noise level of 1dB). In addition, an assessment of noise and vibration nuisance is required for properties subject to a 1dB noise level change. Accordingly, the following methodology has been followed:

- a 72 hour noise survey has been undertaken across the study area to determine the existing noise climate and aid in the identification of key local noise sources (results summarised above);
- the DMRB reports research which identifies that the most significant construction noise impacts occur within 100m of the associated works. On this basis the proposed construction method statement has been reviewed and key potential noise impact areas have been identified;
- for a sample of the identified key potential construction noise impact areas, a series of construction noise level predictions have been undertaken in accordance with BS5228: *Noise and Vibration Control on Construction and Open Sites*. The resulting noise levels have been compared with the guidance contained in Advice Leaflet 72: *Noise Control on Building Sites*, published by the then Department of the Environment in 1976 as agreed with the Local Authority;
- the impact of vibration from construction works is assessed according to the principles of BS 6472:1992: *Evaluation of human exposure to vibration in buildings (1Hz to 80 Hz)*, based on historic vibration monitoring data previously undertaken by WSP Acoustics, and derived separation distances appropriate for a selection for typical construction operations;
- the significance of predicted construction noise and vibration effects has been assessed;
- qualitative consideration has been given to the likely magnitude/significance of noise and vibration impacts associated with construction traffic and traffic diversions that would arise during the construction of the scheme;
- all proposed new road links and local road traffic routes subject to a change in route alignment have been identified. To represent a worst case, it is assumed that these could result in a noise level change of greater than 1dB at local receptors;
- the traffic data for the proposed scheme (produced by Grontmij) has been reviewed to identify other road traffic routes that are predicted to be subject to a traffic flow increase of greater than 25% or decrease of greater than 20%. This assessment has been undertaken comparing the proposed year of opening (2010DM), with the design year with scheme scenario (2025DS);
- the scheme study area has been split into a Core Study Area (the area 300m either side of the proposed new routes, the existing A90 route corridor and existing routes subject to realignment), and a Wider Study Area, other road traffic routes, not in the Core Study Area, subject to a change of at least 1dB as a result of the scheme;
- the Core Study Area has been split into distance bands of 40m (for vibration assessment), 100m (for construction noise assessment) and 300m (for operational noise assessment);
- local noise-sensitive receptors within the Core Study Area have been identified by means of a site walkover, and a review of ordnance survey mapping;
- detailed noise maps have been prepared for four scenarios, 2010DM, 2025DM, 2010DS and 2025DS;
- the results of the noise modelling exercise have been used to present noise level change maps for the study area. Noise level change maps have been prepared for 2025DS versus 2025DM and 2025DS versus 2010DM scenarios;

- noise level changes have been identified for a sample of representative key and typical receptors positions with proposed mitigation in place. Identified level changes have been presented in tabular and mapped form.
- based on detailed noise level predictions for all receptors within the Core Study Area, these receptors have been classified into ambient noise bands of <50dB(A), 50 to <60dB(A), 60 to <70dB(A) and >70dB(A), in accordance with DMRB;
- for each ambient noise band, the number of receptors subject to noise increases / decreases of 1 to <3dB(A), 3 to <5dB(A), 5 to <10dB(A), 10 to <15dB(A), and >15dB(A) has been identified for both the 2010DM versus 2025DM scenario and 2010DM versus 2025DS scenario with the proposed noise mitigation measures in place. The significance of identified noise level changes has been identified, including that at a sample of key and typical receptors;
- for identified routes within the Wider Study Area, the predicted change in road traffic noise levels has been determined in accordance with the CRTN based on traffic flow data derived as part of the traffic assessment (see Chapter 4), and the significance of any identified effects has been identified;
- the noise level changes predicted at Scheduled Ancient Monument and important Listed Building sites have been identified for the 2010DM versus 2010DS scenario. The significance of the identified changes has been assessed;
- a noise nuisance assessment has been undertaken in accordance with the DMRB, for the Core Study Area for all receptors predicted subject to a change of 1dB or greater. This assessment considers both noise level increases and decreases that could arise as a result of the scheme, and those that would result in absence of the scheme;
- the percentage change in noise nuisance level has been categorised into bands of <10%, 10 to <20%, 20 to <30%, 30 to <40 % and => 40%;
- the results of the above nuisance assessments have been summarised in tables for each individual Ambient Noise Band;
- the above nuisance assessment has been repeated for vibration in accordance with the DMRB guidance. This assessment has been completed for all receptors within 40m of Core Study Area that have an unscreened line of sight to nearby traffic routes;
- summary statements have been provided addressing both ambient and predicted noise and vibration levels; and
- the number of properties that are likely to be eligible for statutory insulation in accordance with the Noise Insulation (Scotland) Regulations has been identified.

14.6 POTENTIAL IMPACTS

14.6.1 Permanent

Permanent impacts would be any foreseen non-reversible noise and vibration impacts resulting from the proposed development. In the case of this scheme, it is anticipated that any significant noise and vibration impacts could be reduced by means of further mitigation (if required), e.g. by the installation of additional acoustic barriers. As such, none of the identified impacts would be completely non-reversible. Accordingly the identified impacts are presented in the operational section below.

14.6.2 Construction

- Noise impacts on local sensitive receptors from construction operations including those utilising heavy machinery, e.g. earth moving, piling for bridge works, aggregate spreading and road laying;
- groundborne vibration impacts on local sensitive receptors as a result of construction involving heavy machinery;
- noise impacts on local sensitive receptors as a result of construction traffic accessing the site;
- noise impacts on local sensitive receptors as a result of traffic diversions required during certain stages of the construction; and
- airborne vibration impacts on local sensitive receptors as a result of traffic diversions required during certain stages of the construction.

14.6.3 Operational

- Changes in road traffic noise levels at sensitive receptors, as a result of proposed new highways or realigned / modified existing highways;
- changes in road traffic noise levels at sensitive receptors as a result of changes in road traffic flows on existing, otherwise unchanged local roads;
- changes in airborne vibration levels at sensitive receptors as a result of road traffic on proposed new highways or realigned / modified existing roads; and
- changes in airborne vibration levels at sensitive receptors as a result of road traffic flow changes on existing, otherwise unchanged local roads.

14.7 MITIGATION MEASURES

14.7.1 Mitigation Design Principles

When undertaking mitigation design for a proposed scheme it is necessary to give consideration to all issues affected by and influencing the proposed measures, and not solely the specific issue which the mitigation is designed to address. The Design Manual for Roads and Bridges (DMRB) requires that mitigation measures "*perform to an acceptable standard in traffic, safety, environmental and economic terms*", the DMRB also states that "*it should be remembered that some measures mitigate more than one effect*" and "*Occasionally, mitigation measures can produce adverse as well as beneficial affects. For example, an environmental barrier might increase visual intrusion.*"

Accordingly definition of the outline scheme design followed an iterative process, such that identified impacts could be addressed as the scheme was evolved. Where the potential for an adverse noise impact of minor significance or greater was identified (See Table 14.4), or where there was potential for an impact of similar significance as a result of noise in combination with other impacts, detailed noise mitigation design work was undertaken and feedback provided to the design team.

The design team then gave due consideration to the trade-off between noise mitigation and landscape and visual intrusion resulting from environmental barriers and landscape design, with a view to ensuring that the final design gives equal and diligent consideration to all affected sensitive receptors. Consideration was given to all properties meeting all of the three criteria presented below.

Noise Mitigation Design Criteria
To establish which residential receptors warranted further consideration with respect to noise mitigation, the following qualifying criteria were adopted:

- A daytime 2010DS versus 2010DM $L_{A10\ 18hour}$ noise level increase of 1dB or more at ground or first floor.
- An absolute daytime 2010DS noise level of greater than 59.5dB $L_{A10\ 18hour}$ (façade).
- Properties to be located within 300m of proposed new highways / highway changes (in accordance with the DMRB Assessment methodology).

To qualify for detailed noise mitigation design each of the above three criteria had to be met. These criteria were applied to the 2010DM versus 2010DS scenario.

The first of these criteria was selected based the guidance contained within the DMRB which states that 21% of people are bothered "*very much*" or "*quite a lot*" by an abrupt change in noise level of 1dB and which states that "*people are more sensitive to abrupt changes in traffic noise associated with new road schemes than would be predicted from steady state evidence. In the period following a change in noise traffic flow, people may find benefits or disbenefits when the noise changes are as small as 1dB(A)"*.

To ensure due consideration is given to the absolute noise level at which the onset of effects is expected, the second qualifying criterion was adopted based on guidance contained within the World Health Organisation (WHO) document: 1999: *Guidelines for Community Noise*. This document provides guideline values based on the precautionary principle and states that "*To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB L_{Aeq} on balconies, terraces and in outdoor living areas"*. Planning Policy Guidance Note (PPG) 24: 1994: *Planning and Noise* states that an $L_{Aeq\ 16hour}$ noise level can be approximated by subtracting 2dB from an $L_{A10\ 18hour}$ noise level and CRTN states that the contribution from façade reflections should be assumed to be +2.5dB. These corrections were applied to the 55dB noise level to derive the second qualifying criterion.

The third criterion was adopted based on the assessment methodology contained within the DMRB.

To ensure a worst case assessment, the above criteria were applied to the dwelling façades subject to the highest noise levels, and greatest noise level changes at ground and first floor level. Where properties were subject to noise level increases on some façades and decreases on others, this was noted and considered in the evolution of the mitigation measures. Consideration was given to the magnitude of the noise level increases / decreases and the façade areas affected.

Noise Mitigation Design Process
For qualifying receptors, the benefit of road side noise barriers was considered. Initially, the necessary noise barrier heights and alignments were identified to ensure that at least one of the adopted noise level based qualifying criteria would be achieved at each receptor (i.e. the receptor would no longer qualify for detailed mitigation design consideration).

Whilst for some regions, this was achieved with reasonable barrier design (e.g. heights of less than 1.8m), barrier heights for other regions were such that significant landscape and visual intrusion would arise. A second iteration of the mitigation design was then completed with due consideration to noise and visual and landscape impacts (see Section 11.7).

At some locations it was identified that noise barriers of stone wall construction would integrate well with the local landscape and provide additional ecological benefits.

As a result of the mitigation design process, the proposed noise measures were finalised and are presented in the operational phase section below.

14.7.2 Construction Noise

The nature of construction noise is inherently temporary. As human receptors will generally tolerate higher impacts where is it known that they will only be present for a limited time period, this temporary nature effectively reduces peoples perception of disturbance.

Several safeguards exist to minimise the effects of construction noise and it is anticipated that these would be implemented, where necessary, during the construction of the proposed development. These safeguards include:

- the various EC Directives and UK Statutory Instruments that limit noise emissions of a variety of construction plant;
- guidance set out in BS 5228: Part 1: 1997, which covers noise control on construction sites; and
- the powers that exist for local authorities under Sections 60 and 61 of the Control of Pollution Act 1974 to control environmental noise on construction sites.

In addition, the adoption of Best Practicable Means, as defined in the Control of Pollution Act 1974 is usually the most effective means of controlling noise from construction sites. Other additional measures for the control of noise include the following:

NV1. Silenced or sound reduced compressors, fitted with acoustic enclosures, would be used.
NV2. Silencers or mufflers would be fitted to pneumatic tools.
NV3. Deliveries would be programmed to arrive during daytime hours only and care would be taken to minimise noise when unloading vehicles.
NV4. Delivery vehicles would be prohibited from waiting within the site with their engines running.
NV5. Plant items would be properly maintained and operated according to manufacturers' recommendations, in such a manner as to avoid causing excessive noise. All plant would be sited so that the noise impact at nearby noise-sensitive properties is minimised.
NV6. Local hoarding, screens or barriers would be erected as necessary to shield particularly noisy activities.
NV7. Access to the site would primarily be via the existing A90, which would limit the potential for construction traffic noise impacts.

NV8. Where access is required via the minor road network, appropriate minor roads would be identified and listed within the construction contract details. The use of other minor roads would be prohibited.

NV9. Appropriate noise limits and working hours would be specified in the contract documents, and if required, in the construction Environmental Management System. It is assumed that construction activities would be undertaken during daytime periods only, between the hours of 08:00 to 19:00 hours Monday to Friday and 08:00 to 13:00 hours on Saturday. Should occasional night-time and Sunday working be required, for example to allow erection of superstructures at bridge sites to minimise traffic disruption on the local road network, the contractor would be required to receive permission from Aberdeenshire Council Planning and Environmental Services Department, in advance.

NV10. The contractor would be required to establish and maintain effective liaison with the local community throughout the construction period. This would include provision of information on the on-going activities and provision of contact telephone numbers to contact the site for information during operational hours. A person would be identified with appropriate authority to resolve any problems. A log of complaints and actions taken to remedy these would be available for inspection.

NV11. The scheme design is such that there would be minimal disposal of earth to off-site locations, limiting noise from construction traffic.

Experience from other sites has shown that by implementing the above measures, typical noise levels from construction works can be reduced by approximately 5 to 10dB(A). The appraisal of residual effects assumes that a nominal 5dB noise reduction would be realised.

14.7.3 Construction Vibration

As for construction noise, construction vibration is inherently temporary in nature, which acts to limit the duration of any impacts. In addition the following mitigation measures would be implemented in appropriate locations:

NV12. Piling works would only be required during the construction of the Foveran Overbridge with other structures, e.g. those at Balmedie Junction, South Orrock, Orrock, Dambrae, Newburgh Road Junction and Tipperty incorporating either cast in place reinforced concrete box or portal structures, or bankset foundations on reinforced abutments, or spread footings. The proposed piling method is not currently known, but where possible, the use of cast in place or augured piling, rather than impact driven piling would be adopted.

NV13. During backfilling, roller capping, sub-base compaction and black topping works, it is anticipated that the use of vibratory rollers would be required. As such, it is proposed that vibration monitoring would be undertaken when such operations are undertaken in close proximity to sensitive receptors. This would be undertaken in accordance with the recommendations outlined in BS 5228 Part 4 and BS 7385 Part 1:1990: Evaluation and measurement for vibration in buildings, Part 1: Guide for measurement of vibrations and evaluation of their effects on buildings. The results of such monitoring would be used to ensure that the vibration levels comply with the requirements of BS 7385 Part 2 (which considers the potential for building damage) and BS 6472 (to comply with the recommendations for human comfort).

14.7.4 Operational Phase

The following measures (or those providing similar benefits) would be included in the specific design to reduce noise from the scheme:

NV14. The use of a lower noise road surface for the proposed A90(T) route. Lower noise road surfaces assist in the control of noise from the road/tyre interface (rather than the other key component which is engine, exhaust and transmission noise). Benefits are therefore greatest at high speeds, as applicable to the proposed A90 (T).

NV15. A 1.2m high stone wall, timber barrier or earth bund on the western side of the A90, along the top edge of the cutting between ch1080 to 1170, adjacent to The Holdings.

NV16. A 0.8m high road side earth bund on the western side of the proposed A90 extending from ch320 to 520 adjacent to Drumhead Lodge, surmounted with a 1.6m high stone wall or timber barrier along it's length, and extending to chainage 550 in the north. Alternatively, an equivalent 2.4m high earth bund between ch320 and 520, reducing in height to 1.6m between ch520 and 550.

NV17. A 1.5m high road side stone wall, timber barrier or earth bund on the western side of the proposed A90 extending from ch1300 to 1900 and ch1930 to 2270 and following the top of proposed cut and fill design.

NV18. A 1.8m high timber noise barrier between ch2200 to 2700 and ch2720 to 3300, on top of a 2m high road side earth bund between ch2270 to 2700 and ch2720 to 3300, on the western side of the proposed A90, adjacent to Wardhead and Stoneyards. Alternatively, an equivalent earth bund, 1.8m in height between ch2200 to 2270 and 3.8m in height between ch2270 to 2700 and ch2720 to 3300.

NV19. Incorporation of an earth bund varying in height between 2 and 4m on the eastern side of the proposed A90 extending from ch3400 to 4000, adjacent to Aikenshill.

NV20. A 1.8m high timber noise barrier located on top of a 2m high road side earth bund, or equivalent 3.8m high earth bund extending from ch4100 to 4600 on the western side of the proposed A90 and adjacent to Kirkhill.

NV21. A 1.2m high timber roadside noise barrier, stone wall or earth bund located along the eastern side of the A90 from ch8050 to 8680

For noise reduction purposes, the proposed stone walls and noise barriers would have a superficial density of at least 12.5kgm^{-2} (based on the superficial density calculation procedure presented in CRTN), be continuous, imperforate and sealed at the base.

Further detail on the benefit provided by the proposed barriers, and the receptors for which this benefit is afforded is presented in the Mitigation Benefit Section below.

14.8 ASSESSMENT OF RESIDUAL EFFECTS

14.8.1 Permanent

No permanent non-reversible noise or vibration effects are predicted from the proposed development.

14.8.2 Construction

The total construction phase for the development is expected to be some 18 to 24 months (see Section 3.3.3). Accordingly, it is appropriate to consider the temporary noise and vibration impacts that could arise during this period. It is anticipated that impacts could arise as a result of:

- construction plant;
- construction traffic; and
- traffic diversions, if required to facilitate occasional online works.

Typical activities associated with the construction of the scheme would be earthworks, backfilling and rolling capping, sub-base compaction, black topping, drainage works, and structure fabrication. Of these, it is anticipated that the earthworks would be the most extensive, with structure fabrication works having the potential to generate the highest noise levels.

The most intensive earthworks are proposed at the locations of the three new junctions, namely at Balmedie Junction, Newburgh Road Junction and Tipperty Junction, whilst structure fabrication is proposed at Balmedie Junction, South Orrock Underpass, Orrock Overbridge, Dambrae Underpass, Newburgh Road Junction, Foveran Overbridge and Tipperty Junction.

It is understood that the backfilling and rolling capping, sub-base compaction and blacktopping typically utilise vibratory roller techniques, whilst structure fabrication may require some form of piling for the Foveran Overbridge. Such activities have the potential to generate significant groundborne vibration levels.

With respect to construction noise impacts, the DMRB states that "*disruption due to construction is generally a more localised phenomenon than the impacts of a scheme once it has opened to traffic. One study has shown that at least half the people living within 50m either side of the site boundary were seriously bothered by construction nuisance in one form or another, but that beyond 100m, less than 20% of the people were seriously bothered*" Accordingly, this assessment is concentrated on receptors within 100m of the anticipated construction works.

14.8.2.1 Plant Noise

Table 14.15 summarises the receptors identified within 100m of the proposed new road, proposed new link roads and existing routes subject to redesign. For the purpose of this assessment, it is assumed that noise and vibration resulting from the development of new access drives at isolated local properties or property groups would be limited to short periods of time, and as such have been discounted. The following assessment considers residential receptors only as these are considered to be the most sensitive and to be representative of other locations near the scheme.

Also presented are details of the existing noise climate, the distance from the proposed works and the brief description of works proposed with 100m.

Table 14.15: Local Residential Receptors within 100m of Proposed Construction Works.

Receptor Number	Description	Existing Noise Climate	Proposed Works	Approximate distance from Proposed Works
1	9 dwellings at Millden, Jandel and Millden Farm	Dominated by road traffic noise from the A90	Works associated with the proposed highway link road between the B977 and the A90 south of Balmedie	Between 10 and 80m
2	5 dwellings at South Folds	Dominated by road traffic noise from the A90	Works associated with Balmedie Junction, proposed main highway and proposed B977 realignment	Between 20 and 75m
3	Approximately 43 dwellings on the western edge of Balmedie	Dominated by road traffic noise from the A90	Works associated with Balmedie Junction and proposed main highway	Between 10 and 100m
4	3 dwellings on the west side of the A90, opposite Balmedie	Dominated by road traffic noise from the A90	Works associated with the proposed main highway and proposed B977 realignment	Between 20 and 80m
5	The Bungalow dwelling	Dominated by road traffic noise from the A90	Realignment of existing A90, to lead into Balmedie	20m
6	Seven Acres dwelling	Distant road traffic from A90	Realignment of local road	10m
7	Dambrae dwelling	Distant road traffic from A90	Realignment of local road	45m
8	Newtyle Croft dwelling	Distant road traffic from A90	Realignment of local road	90m
9	4 dwellings at Mill of Foveran	Distant road traffic from A90	Realignment of local road	Between 10 and 60m
10	Fountainbleau dwelling	Dominated by road traffic noise from the A90	Realignment of local road, works on proposed main highway, and new slip roads for Tipperty Junction	Between 10 and 85m
11	Approximately 21 dwellings at Bridgend and Tipperty	Dominated by road traffic noise from the A90	Work associated with the main highway and realignment of local road	Between 20 and 100m

Table 14.15 shows that receptors 1, 5, 6, 7, 8 and 9 would only be subject to noise from construction works associated with localised construction works, e.g. that associated with local route re-alignments or proposed new local highway link roads. Receptors 2, 3 and 4 would be subject to noise associated with works for the proposed main road and that from local route re-alignments and the

preparation of new junctions. Receptors 9 and 10 would be subject to noise from work associated with the main road and local road re-alignments / new slip roads.

Accordingly, a series of example construction noise calculations have been undertaken for receptors 2, 3 and 4, which are considered to represent a worst case.

Although there are techniques available to predict the likely effect of noise from construction works, such as those contained within BS 5228, they are necessarily based on detailed information of the type and number of plant being used, their location and the length of time they are in operation.

Such specific details are not available at this stage and would depend on the appointed construction contractor (see Section 3.3.2). However, an estimate of the likely effects of noise during the site preparation and construction phases has been made for the identified receptors. The predictions are based on the methodology contained within BS 5228 and are in terms of the $L_{Aeq,T}$ over the core working day, which is assumed to be 08:00 to 19:00 hours. It is assumed that the committed mitigation measures would result in a minimum noise reduction of 5dB.

As noted above, it is anticipated that the earthworks phase of works would be the most extensive, whilst the structure fabrication works has the potential to generate the highest noise levels. Receptors 1 and 2 are located within 100m of the Balmedie Junction works so construction noise predictions have been undertaken for both earthworks and structure fabrication. For Receptor 3, predictions have been undertaken for the earthworks phase only.

Table 14.16 below sets out the typical plant type, number and utilisation (the percentage of time plant is likely to be operating during the working day – the 'on time') used in the prediction of noise levels during each phase.

For the purpose of these predictions, it is assumed that the intervening ground between the construction noise sources and the receivers would be acoustically hard such that there would be no additional attenuation of noise due to ground absorption, and that no acoustic barriers would be present.

Table 14.16: Assumed Construction Plant Details (Taken from BS5228 Part 1)

Phase	Plant Type	Sound Power Levels L_{WA} dB	Number of Plant	Assumed Percentage 'on' time
Earth Works	Tracked Exactors	106	2	50
	Pneumatic breaker	116	1	30
	Lorry pulling up	98	4	10
	Dozer	112	2	40
Structure Fabrication	Tracked excavator	106	2	25
	Lorry mounted concrete pump	106	1	30
	Truck Mixer	100	1	30
	Compressor	100	1	75
	Poker vibrator	98	2	30

Worst case and average case construction operations have been considered. The worst case considers works at the closest point in the relevant site regions to the receptor under consideration. The average case considers works at the approximate mid-point of the relevant site regions. Where the closest point of the relevant site area to the receptor is small, it is considered unreasonable to assume all plant would be located at this distance, therefore the noise level generated by the single loudest plant item is considered.

Table 14.17 sets out the range of predicted construction noise levels. The range extends from the average to the worst case situation as described above.

Table 14.17: Predicted 'Average' and 'Worst' Case Construction Noise Levels – Façade $L_{Aeq\ 11hours}$ dB

Receptor	Average and Worst Case Construction Noise Levels, $L_{Aeq\ 11hours}$ dB	
	Earth Works	Structure Fabrication
2	73.3 – 74.3	65.6 – 66.9
3	70.2 – 80.3	62.5 – 72.9
4	72.1 – 74.3	N/A

It can be seen from Table 14.17 that for each receptor and each considered construction phase, the average construction noise levels are below 75dB $L_{Aeq,T}$, a criterion appropriate for receptors in the vicinity of busy main road traffic[198]. For the worst case, the predicted noise levels also meet the 75dB criterion with the exception of Receptor 2 during the earth works phase. Where the adopted 70dB criterion is exceeded, it is assumed that temporary moderate adverse effects could arise. Where the criterion is not exceeded, it is anticipated that temporary increases in the noise environment could arise resulting in temporary minor adverse effects.

A 70dB criterion is appropriate for adoption for receptors located in rural areas, away from main road traffic. Therefore, should the above noise levels be generated at other receptors well removed from the existing A90, similar temporary adverse effects ranging from minor to moderate could arise.

However, it should be noted that the predicted worst case noise levels are likely to occur for just a few days at each receptor location and would be similar to, for example, the temporary noise that would occur when undertaking repairs to services such as water or electricity mains. For the purpose of this assessment it is considered more appropriate to consider the average case which is anticipated to be more representative of typical conditions during the construction phase.

14.8.2.2 Vibration

There are currently no British Standards that provide a methodology to predict levels of vibration from construction activities, other than that contained within BS 5228: Part 4, which relates to percussive or vibratory piling only. However, it is generally accepted that for the majority of people, vibration levels in excess of approximately 0.15 mms^{-1} peak particle velocity are just perceptible at frequencies between 8 and 80 Hz. On this basis, Table 14.18 details the distances at which certain activities give rise to a just perceptible level of vibration. These figures are based on a variety of historical field measurements.

[198] Advisory Leaflet 72: Construction and Noise

Table 14.18: Approximate Distances at which Vibration May Just Be Perceptible

Construction Activity	Distance from Activity when Vibration may be just Perceptible
Excavation	10-15m
Heavy Vehicles (e.g. dump trucks)	5-10m
Hydraulic Breaker	15-20m
Driven / Vibratory Piling	50-150m

There are several receptors located within the distances specified for excavation, heavy vehicles and hydraulic breaking work. However, the figures presented above correspond to the onset of perceptibility, and the levels required to result in the onset of building damage, for example hair line cracks in plaster work) are orders of magnitude greater.

It is anticipated that piling operations would only be required for the construction of the Foveran Overbridge, which is located at a distance of greater than 100m from vibration sensitive receptors.

In addition to the construction activities presented in Table 14.18, it is anticipated that vibratory rollers would be used during the backfilling, roller capping, sub-base compaction and black topping works. Such works would be undertaken in close proximity some sensitive receptors such as local dwellings. Whilst it is expected that the on-set of building damage would not arise unless undertaken within distances of approximately 10m[199], it is proposed that vibration monitoring during the course of such work would take place to ensure that potentially damaging effects were identified proactively and if necessary further mitigation identified.

This would be undertaken in accordance with the recommendations outlined in BS 5228 Part 4 and BS 7385 Part 1:1990: Evaluation and measurement for vibration in buildings, Part 1: Guide for measurement of vibrations and evaluation of their effects on buildings. The results of such monitoring would be used to ensure that the vibration levels comply with the requirements of BS 7385 Part 2 (which considers the potential for building damage) and BS 6472 (to comply with the recommendations for human comfort).

14.8.2.3 Construction Traffic

The development would primarily be accessed via the existing A90, which is a heavily trafficked route. It is anticipated that the effect of the additional construction traffic on this route would result in only temporary negligible adverse noise effects at worst.

Access would also be required to parts of the works via the minor road network in proximity to the scheme. The roads permitted to be used by construction traffic would be listed in the construction contract and the use of other minor local routes would be prohibited. Best use of the internal haul road would be made to reduce the potential for unnecessary effects.

In general terms, an increase in flow of 100% would be required to result in a 3dB noise level increases (assuming the percentage HGVs remains the same). It is anticipated that appropriate local road traffic routes could be identified to ensure

[199] Based on a variety of historic field measurements

that associated noise effects would be temporary and of minor adverse significance at worst (See Table 14.4).

14.8.2.4 Traffic Diversions

The A90 construction would be completed almost entirely offline, away from the existing strategic network. Any noise and vibration impacts on local traffic would therefore be limited to points where the new road ties into the existing road network, at the northern and southern points, or where the proposed road crosses the existing A90 (the Newburgh Road and Tipperty junctions would be constructed offline and would not require any major diversionary routes, or temporary traffic management on the existing A90).

The roads potentially affected by the scheme are the A90, B977, A975 and B9000.

Alternative routes to the north are via the B999 which runs parallel with the A90, approximately 5km to the west. Currently the A90 is designated as a high load route whereas the B999 is not, therefore it might not be suitable for larger vehicles or for carrying high traffic flows.

The A975/B9000 also provides an alternative route diverting traffic from the northern section of the A90. This road however routes traffic through the village of Newburgh.

Consequently, it is anticipated that occasional temporary adverse noise and vibration effects could arise at receptors adjacent to proposed diversionary routes ranging from minor to major significance. However, coincident occasional temporary beneficial effects ranging from minor to major significance would arise at receptors adjacent to sections of the A90 from which the traffic has been diverted.

14.8.3 Operational

14.8.3.1 Mitigation Benefits

As noted above, a detailed noise mitigation design process was followed, resulting in the specification of a series of noise reducing measures which would include stone walls, earth bunds and noise barriers (see Section 14.7.4).

Table 14.19 below presents the benefit afforded at a sample of local properties as a result of the proposed measures. Following the adopted design process, noise levels are presented for the 2010DS scenario, with and without the proposed mitigation measures in place.

Table 14.19: Modelled 2010DS Noise Levels, With and Without Proposed Noise Mitigation at Sample Receptors, Ground Floor, Façade, dB(A)

Mitigation Measure	Sample Receptors [Other Receptors that would benefit]	2010DS Noise Level, $L_{A10\ 18hour}$		Mitigation Benefit
		With Mitigation	Without Mitigation	
NV15	Dwelling at The Holdings (east)	75.5	77.6	2.1
NV16	Drumhead Lodge	63.1	65.1	2.0
NV17	Dwellings at Orrock House	57.3	58.7	1.4

Mitigation Measure	Sample Receptors [Other Receptors that would benefit]	2010DS Noise Level, $L_{A10\ 18hour}$		Mitigation Benefit
		With Mitigation	Without Mitigation	
NV18	Hill of Menie Croft [Ward Head, Seven Acres, Pet Cemetery, Stoneyards Cottages, Stoneyards, Cottages at Cowhill]	60.1	61.1	1.0
NV18	Stone Yards Cottages [Hill of Menie Croft Ward Head, Seven Acres, Pet Cemetery, Stoneyards, Cottages at Cowhill]	63.1	65.0	1.9
NV19	Dwellings at Aikenshill [Dwellings at corner of Aikenshill Access Road, Aikenshill Farm]	58.8	59.8	1.0
NV20	Dwellings at Kirkhill	57.3	60.2	2.9
NV21	Dwellings at Fornety	57.4	59.8	2.4

14.8.3.2 Noise

At DMRB Stage 3, the noise assessment requires consideration and classification of noise sensitive-receptors according to noise level increases and decreases. The DMRB states that "*all calculations should be based on the maximum traffic flow expected on a normal working day during the first 15 years after opening, using the highest traffic flow forecasts*" and that "*parallel calculations should be made for the Do Minimum option*".

A noise nuisance assessment is also required for properties subject to a 1dB or greater noise level increase. The DMRB states that "*All calculations should be based on the highest nuisance levels expected during the first 15 years after opening*" and "*When the scheme will cause noise increases, this will usually be the nuisance level experienced soon after opening*", and "*For noise decreases and the do minimum situation, the highest nuisance experienced during the first 15 years after opening will usually be that in the 15th year*". The 15th year after opening is defined as the Design Year.

Therefore, to facilitate these assessments, it is necessary to predict the noise levels at all receptors within the Core Study Area for the following scenarios:

- Year of Opening Do minimum (2010DM), taken as the baseline situation in the assessment;
- Year of Opening Do Something (2010DS);
- Design Year Do Minimum (2010DM); and
- Design Year Do Something (2025DS).

To allow "*parallel calculations*" as specified, three additional noise models were prepared in the CadnaA noise modelling suite, based on the completed baseline noise model. The 2025DM model is identical to the 2010DM model with the exception of the traffic data which was updated accordingly.

The 2010DS and 2025DS models incorporate the final 3 dimensional cut and fill route design for the proposed scheme including the proposed new A90 route design, new minor local link roads, and minor local roads subject to redesigns, including changes in elevation. For each scenario, the traffic flow data were then updated accordingly for each scenario.

The noise maps for each scenario are included as Figures 14.4a-b, 14.5a-b, 14.6a-b and 14.7a-b which also show the Core Study Area. In addition, consideration has been given to the predicted noise levels at a sample of key and typical receptors for the 2010DS and 2025DS scenarios as shown in Table 14.20 below. These data are also presented in mapped form in Figure 14.3. In accordance with the requirements of the DMRB, the Do Something noise levels have been predicted with the proposed noise mitigation measures in place.

Table 14.20: Modelled 2010DS and 2025DS Noise Levels at Representative Sample Receptors, Façade, dB(A)

Location Number	Receptor	2010DS Noise Level, $L_{A10\ 18hour}$		2025DS Noise Level, $L_{A10\ 18hour}$	
		Ground Floor	First Floor	Ground Floor	First Floor
1	Wester Hatton Cottages	70.8	73.7	72.3	75.1
2	Jandel	60.1	61.8	61.4	63.1
3	Dwelling at South Folds	60.6	62.7	61.4	63.6
4	Dwelling in Balmedie (south)	62.0	63.8	63.1	65.0
5	Dwelling at The Holdings (west)	54.8	56.9	53.8	55.8
6	Dwelling at The Holdings (east)	75.5	79.1	76.4	80.0
7	Dwelling in Balmedie (west central)	58.3	60.4	59.3	61.3
8	Dwelling in Balmedie (western edge)	76.5	79.4	77.4	80.4
9	Dwellings at Kier	65.0	66.4	66.0	67.3
10	Dwelling in Balmedie (north central)	52.9	55.6	53.8	56.5
11	Drumhead Lodge	63.1	64.5	64.1	65.4
12	Dwelling in Drumhead	56.6	58.2	55.7	57.0
13	The Bungalow	67.7	68.9	68.6	69.9
14	Dwelling at North of Blairton	59.5	60.3	60.4	61.2
15	Dwellings at South Orrock	62.8	64.0	63.8	65.0
16	The Cock and Bull	54.9	57.5	55.0	57.7
17	Sidney Cottage	61.5	63.0	62.2	63.5
18	Dwellings at Orrock House	57.3	58.5	58.3	59.4
19	Pettens	55.4	56.1	56.3	57.0
20	Dwellings at Boghead	58.0	58.7	59.0	59.6
21	Hill of Menie Croft	60.1	61.1	61.0	62.0
22	Hill of Menie	57.9	60.5	57.8	60.4
23	Wardhead	57.4	58.4	58.4	59.4
24	Summerlee	55.4	56.3	56.3	57.2
25	Dambrae	57.0	58.5	57.8	59.3
26	Cowhill	53.4	54.3	54.4	55.3
27	Stoneyard Cottages	63.1	64.0	64.1	65.0
28	Dwelling at Delfrigs	62.0	63.9	62.8	64.7
29	Dwellings at Aikenshill	58.8	59.6	59.8	60.6
30	Dwellings at Newtyle	55.4	56.7	56.5	57.8
31	Dwellings at Rashiereive	58.0	60.2	58.9	61.1
32	Dwellings at Kirkhill	57.3	58.1	58.4	59.2
33	Dwellings at Newtyle Croft	67.4	69.6	68.3	70.5
34	Dwelling at Blairythan Smithy	66.2	67.9	67.0	68.7
35	Blairythan Cottages	66.8	68.4	67.6	69.2
36	Dwelling at Foveran	58.8	61.0	59.7	61.9
37	Foveran School	63.4	65.3	64.1	66.0
38	Dwellings at Mill of Foveran	58.6	60.1	59.5	61.0
39	Westfield Cottage	59.8	60.1	60.7	61.0
40	Dwellings at Pitmillan	57.0	57.7	58.0	58.6

Location Number	Receptor	2010DS Noise Level, $L_{A10\ 18hour}$		2025DS Noise Level, $L_{A10\ 18hour}$	
		Ground Floor	First Floor	Ground Floor	First Floor
41	Dwelling at West Pitmillan	55.8	57.0	56.8	58.0
42	Fountainbleau	66.5	68.7	67.5	69.7
43	South Farden	61.1	63.0	62.0	64.0
44	Dwellings at Fornety	57.4	58.0	58.4	59.0
45	Dwelling at Bridgend (eastern edge)	69.8	72.1	70.7	73.1
46	Dwelling at Tipperty (central)	66.6	67.4	67.6	68.4

14.8.3.3 Noise Level Changes Classification

The DMRB requires that noise level changes be classified into specified change bands for each ambient noise band presented in Table 14.12 above. Consideration has been given to the changes that would result from the following three scenarios:

- 2025DM versus 2010DM;
- 2025DS versus 2010DM; and
- 2010DS versus 2010DM

Comparison of these scenarios, in conjunction with the absolute noise level predictions then allows the noise nuisance assessment to be completed in full.

Noise level change maps for each of these scenarios have been prepared and can be seen in Figures 14.8a-b, 14.9a-b and 14.10a-b respectively. In addition, consideration has been given to the predicted noise level changes at a sample of key and typical receptors, as shown in Table 14.21 below.

Figure 14.8a-b presents the noise level changes that would arise without the scheme i.e. 2025DM vs 2010DM. Figure 14.9a-b presents the combined affect of the scheme opening and natural traffic growth over the following 15 years i.e. 2025DS vs 2010DM, whilst Figure 14.10a-b presents the noise level changes that would arise as a result of the opening of the scheme alone i.e. 2010DS vs 2010DM.

It can be seen that Figures 14.9a-b and 14.10a-b are very similar in appearance, the notable differences being as follows:

- In general, slightly greater noise level changes are predicted for the 2025DS versus 2010DM scenario than for the 2010DS versus 2010DM scenario, due to the inclusion of the effect of natural traffic growth over time.

- In the south-west region of the Core Study Area, marginally lower noise level changes are predicted for the 2025DS versus 2010DM scenario, due to lower traffic flow rates in this area following the opening of the Aberdeen Western Peripheral route (if this is constructed).

Table 14.21 below presents the noise level changes associated with each scenario for a sample of representative key and typical noise sensitive locations. These data are also presented in mapped form in Figure 14.3. In accordance with the requirements of the DMRB, Do Something noise levels have been predicted with the proposed noise mitigation measures in place.

Table 14.21: Predicted Noise Level Changes at Representative Sample Receptors, Façade, Ground Floor, dB(A)

Location Number	Receptor	Noise Level Change		
		2025DM-2010DM	2010DS-2010DM	2025DS-2025DM
1	Wester Hatton Cottages	1.4	-0.1	1.4
2	Jandel	1.3	0.1	1.4
3	Dwelling at South Folds	1.4	-1.1	-0.3
4	Dwelling in Balmedie (south)	1.5	1.1	2.2
5	Dwelling at The Holdings (west)	1.4	2.3	1.3
6	Dwelling at The Holdings (east)	1.4	-1.1	-0.2
7	Dwelling in Balmedie (west central)	1.3	0.5	1.5
8	Dwelling in Balmedie (western edge)	1.4	0.3	1.2
9	Dwellings at Kier	1.3	0.3	1.3
10	Dwelling in Balmedie (north central)	1.1	0.0	0.9
11	Drumhead Lodge	0.9	1.3	2.3
12	Dwelling in Drumhead	-0.3	0.6	-0.3
13	The Bungalow	0.9	-3.3	-2.4
14	Dwelling at North of Blairton	1.0	-1.3	-0.4
15	Dwellings at South Orrock	1.0	4.6	5.6
16	The Cock and Bull	0.9	-19.3	-19.2
17	Sidney Cottage	0.9	-15.5	-14.8
18	Dwellings at Orrock House	1.0	4.4	5.4
19	Pettens	1.0	-3.4	-2.5
20	Dwellings at Boghead	1.0	3.6	4.6
21	Hill of Menie Croft	0.9	5.1	6.0
22	Hill of Menie	0.9	-15.4	-15.5
23	Wardhead	0.9	5.0	6.0
24	Summerlee	0.9	-5.3	-4.4
25	Dambrae	0.9	-3.2	-2.4
26	Cowhill	1.0	3.5	4.5
27	Stoneyard Cottages	1.0	7.8	8.8
28	Dwelling at Delfrigs	1.0	-14.9	-14.1
29	Dwellings at Aikenshill	1.0	6.1	7.1
30	Dwellings at Newtyle	0.9	-10.2	-9.1
31	Dwellings at Rashiereive	1.0	-15.9	-15.0
32	Dwellings at Kirkhill	1.0	8.4	9.5
33	Dwellings at Newtyle Croft	0.9	-0.1	0.8
34	Dwelling at Blairythan Smithy	1.0	-11.0	-10.2
35	Blairythan Cottages	1.0	-11.6	-10.8
36	Dwelling at Foveran	0.9	-1.8	-0.9
37	Foveran School	1.0	-7.8	-7.1
38	Dwellings at Mill of Foveran	1.0	1.6	2.5
39	Westfield Cottage	0.9	-0.8	0.1
40	Dwellings at Pitmillan	0.9	3.4	4.4
41	Dwelling at West Pitmillan	1.0	-1.7	-0.7
42	Fountainbleau	1.0	-5.3	-4.3
43	South Farden	1.0	0.5	1.4
44	Dwellings at Fornety	0.9	0.5	1.5
45	Dwelling at Bridgend (eastern edge)	0.9	0.1	1.0
46	Dwelling at Tipperty (central)	1.0	0.2	1.2

The noise level changes for all the core study area receptors, split into ambient noise level band, are presented in Appendix 14.3, with summaries presented in Tables 14.22 and 14.23 below.

Table 14.22: Numbers of Receptors Subject to Different Noise Level Changes for Core Study Area, 2010DM versus 2025DM

Increase / Decrease	Noise Level Change Bands, dB(A)	Receptor Category		
		Residential	Commercial / Industrial	Community Facilities
Decrease	>-15	0	0	0
	>-10 to -15	0	0	0
	>-5 to -10	0	0	0
	>-3 to-5	1	0	1
	>-1 to -3	7	1	1
Increase	>1 to 3	427	9	13
	>3 to 5	0	0	0
	>5 to 10	0	0	0
	>10 to 15	0	0	0
	>15	0	0	0

Table 14.23: Numbers of Receptors Subject to Different Noise Level Changes for Core Study Area, 2010DM versus 2025DS

Increase / Decrease	Noise Level Change Bands, dB(A)	Receptor Category		
		Residential	Commercial / Industrial	Community Facilities
Decrease	>-15	5	2	1
	>-10 to -15	16	1	1
	>-5 to -10	18	0	2
	>-3 to-5	16	1	3
	>-1 to -3	23	0	1
Increase	>1 to 3	359	4	6
	>3 to 5	16[1]	1	1
	>5 to 10	20[1]	0	2
	>10 to 15	0	0	0
	>15	0	0	0

[1] Several receptors subject to significant noise level decreases on opposite facades, which are otherwise unaccounted for in the assessment.

Comparing the content of Table 14.22 with the impact matrix presented in Table 14.4, it can be seen that for the 2025DM v 2010DM scenario, the significance of noise level changes at all commercial receptors is predicted to be 'none'. For community facilities receptors, one is predicted subject to a beneficial minor effect with the remainder subject to a significance of 'none'. For residential properties, 427 are predicted subject to adverse effects of minor significance, seven subject to beneficial effects of minor significance and, a single roadside dwelling in Drumhead, subject to a beneficial effect of moderate significance.

With respect to Table 14.23 (which includes the effect of natural traffic growth and the scheme), the significance of noise level changes is predicted to be none at six industrial receptors with 3 subject to beneficial effects of moderate significance (The Bon Accord Granite Centre, Car Dealership and Steel Rendering Yard all of which are at Rashierieve). For community facilities, seven are predicted subject to a significance of 'none', one subject to an adverse effect of minor significance,

two subject to an adverse effect of moderate significance (Orrock House (LB) and Balmedie Pet Cemetery), three subject to beneficial effects of minor significance, two subject to beneficial effects of moderate significance (Belhelvie Church and Foveran School) and two subject to beneficial effects of major significance (Menie Lodge (LB) and The Cock and Bull public house).

For residential receptors, it can be seen that the majority, of receptors, 359, remain subject to adverse effects of minor significance, with 23 subject to beneficial effects of minor significance, 16 are subject to adverse effects of moderate significance, 20 are subject to adverse effects of major significance, 16 subject to beneficial effects of moderate significance and 39 subject to beneficial effects of major significance. A summary of the properties predicted subject to moderate and major effects (beneficial and adverse) is presented in Table 14.24.

Table 14.24: Summary of Residential Receptors within the Core Study Area Predicted Subject to Major and Moderate Noise Level Increases/Decreases.

Effect Significance	Adverse / Beneficial	Summary of Residential Receptors
Moderate	Adverse	4 dwellings at Pitmillan 3 dwellings at Mill of Foveran 1 dwelling at Drumhead 3 dwellings at Cowhill 2 dwellings at Boghead 1 dwelling at Aikenshill 1 dwelling at Balmedie Jaswood dwelling
Major	Adverse	Wardhead dwelling 3 dwellings at Stoneyards 2 dwelling at South Orrock Seven Acres dwelling 2 dwellings at Orrock House 2 dwellings at Kirkhill Hill on Menie Croft 1 dwelling at Cowhill 7 dwellings at Aikenshill
Moderate	Beneficial	Summerlee dwelling 3 dwellings at Foveran 1 dwelling at Pettens 2 dwellings at Mill of Blairton 1 dwelling at Hill of Menie Fountainbleau dwelling 6 dwellings at Balmedie 1 dwelling at Drumhead
Major	Beneficial	6 dwellings at Balmedie 2 dwellings at Blairythan Blairythan Smithy 1 dwelling at Bagboy 3 dwelling at the Cock and Bull 5 dwellings at Delfrigs 1 dwelling at Hill of Menie 5 dwellings at Foveran 4 dwellings at Newtyle Old Mill Croft dwelling 2 dwellings opposite Old Mill Croft 3 dwellings at Rashierieve

Effect Significance	Adverse / Beneficial	Summary of Residential Receptors
		Sea View dwelling Sidney Cottage dwelling 2 dwellings at Southlea Westlodge Menie dwelling

In accordance with the DMRB, one prediction location is adopted for each receptor. However, there are several receptors which would be subject noise level increases on some façades and noise level decreases on others. An example is the dwellings at Aikenshill, where the existing A90 is to the east, and the proposed A90 is to the west. Eastern façades would be subject to noise level decreases whilst western façades would be subject to noise level increases. Where the noise level increases and decreases are similar in magnitude, consideration has been given to the façade subject to a noise level increase, otherwise, consideration has been given to the faced subject to greatest change.

It can be seen from Table 14.23 and 14.24 that overall, a greater number of properties would be subject to noise level decreases than increases. Also, the magnitude of the predicted changes is greater for the identified decreases.

For the Wider Study Area, consideration has been given to the Basic Noise Level changes anticipated for each local road traffic route. The findings of the traffic modelling have been used to undertake road traffic noise calculations in accordance with CRTN for the 2010DM, 2025DM and 2025DS scenarios, such that the effect of the scheme both with and without natural traffic growth can be assessed.

This assessment method considers the noise level change associated with each road traffic route, rather than considering the noise level changes that would arise at every individual property in the vicinity of each route.

The calculations have been undertaken for a notional receptor location 10m from the edge of the carriageway of each road considered, and 1.5m above ground level. A notional receptor has been used because the change in traffic noise level adjacent to any given road will be the same at all distances where noise from this route is dominant. Traffic noise calculations have been undertaken to establish the change in the $L_{A10\ 18hour}$ noise level.

However, it should be noted that the CRTN methodology is strictly only valid for traffic flows of greater than 1000 vehicles per day, defined in CRTN as the 18 hours between 06:00 and 00:00 hours. Where traffic flows are between 1000 and 4000, CRTN employs a 'low flow' correction in the calculation procedure.

There is no other recognised traffic noise prediction model that is valid for traffic flows below 1000 per day. Therefore, in the absence of any suitable alternative methodology, the following noise calculation method has been adopted for routes with flow rates below this volume. This methodology is hereafter referred to as the ‘low flow method’ and where used, the resulting noise levels are presented in bold type in the table below.

The ‘low flow method’ is based on the assumption that the traffic flow is 1000 vehicles per 18 hour period, the lower boundary of validity for the CRTN. The

standard acoustic principle of a 3dB decrease per halving of source flow is then applied to identify the noise level associated with the low flow route.

This 'low flow method' should only be considered an approximation to the likely resulting noise levels, as at low flow volumes, the traffic will behave as a number of individual moving 'point' noise sources rather than as a single acoustic 'line' source, which is inherent in the CRTN procedure.

The results of the noise level calculations are presented in Table 14.25, the final column presents the noise level changes as a result of the scheme and natural traffic growth (C-A), and that as a result of the scheme alone (C-B). The location of the considered routes can be seen in Figure 14.1a-b.

Table 14.25: Predicted Changes in Road Traffic Noise Levels in the Wider Study Area Resulting from Operation of the Scheme, Free-field - dB(A)

Location	Predicted Noise Level dB $L_{A10\ 18hours}$			Change / Difference in Noise Level
	2010DM (A)	2025DM (B)	2025DS (C)	(C-A) / (C-B)
Eigie Road West of Pettens Street	61.4	63.0	65.4	+4.0 / +1.4
Eigie Road North of Pettens Street	60.6	62.2	63.9	+3.3 / +1.7
Eigie Road North of Eigie Crescent	55.5	**53.8**	**46.3**	-9.2 / -7.5

Table 14.25 shows that Eigie Road west and north of Pettens Street is predicted to be subject to noise level increases of between 3 and 4dB when including natural traffic growth, and of less than 2dB as a result of the scheme alone. Considering the impact matrix adopted for this assessment, it can be seen that noise increases associated with the scheme development would result in minor adverse effects for residential receptors fronting these routes.

For Eigie Road North of Eigie Crescent, noise decreases of 7.5dB are predicted as a result of the scheme. These noise decreases correspond to major beneficial effects for receptors fronting this route.

14.8.3.4 Noise Level Changes at Historic Sites

In recognition of Historic Scotland's (HS) concerns about noise level changes at Scheduled Ancient Monuments (SAM) and Listed Buildings (LB), consideration has been given to those sites presented in Section 14.4.2. The sites which are located within the Core Study Area have been included in the DMRB assessment as individual receptors. The predicted 2010DM and 2010DS noise levels and associated noise level changes at each key location are presented in Table14.26 below.

This table also presents the corresponding significance of effect assuming that these receptors have a medium sensitivity (see Table 14.5).

Table 14.26: Noise Level Changes as a Result of Scheme Opening for Scheduled Ancient Monuments and Listed Buildings (2010DM v 2025DS)

Historic Site	Noise Level, dB $L_{A10\ 18hour}$			
	2010DM	2010DS	Noise Level Change (dB)	Significance
Temple Stones	49.3	49.5	0.2	None
Hare Cairn	55.1	55.7	0.6	None
Balmedie Lodge	66.9	67.2	0.3	None
Balmedie House	55.6	56.5	0.9	None
Orrock House	58.7	65.5	6.8	Moderate Adverse
Orrock House Dovecot	48.2	51.4	3.2	Minor Adverse
Belhelvie Old Parish Church	63.4	56.6	-6.8	Moderate Beneficial
Menie House	51.2	50.2	-1.0	None
Menie Lodge	73.5	61.1	-12.4	Major Beneficial
Mill of Foveran	57.4	59.8	2.4	None

Table 14.26 indicates that six of the sites have a noise effect significance of 'none' whilst two would be subject to beneficial effects and two adverse effects. Adverse effects are identified to be Minor and Moderate whilst beneficial effects are predicted to be Moderate and Major. Overall it can be seen that beneficial effects are predicted to be greater than adverse effects.

14.8.3.5 Change in Noise Nuisance for Do Minimum Scenario

For the Do Minimum Scenario, the change in noise nuisance has been considered between the year of opening (2010DM) and the design year (2025DM).

It is assumed that changes in road traffic for the Do Minimum Scenario would be gradual over time, and as such, this assessment uses the 'steady state' nuisance assessment method presented in the DMRB. The percentage of people bothered 'very much or quite a lot' by road traffic noise has been identified for each receptor within the Core Study Area for both the 2010DM and 2025DM scenarios. The difference between the two figures has been identified as the change in percentage of people bothered.

The DMRB requires that noise nuisance changes at receptors subject to noise level changes of 1dB or greater be classified into specific percentage change bands for each different ambient band presented in Table 14.12. The identified nuisance changes are presented in Appendix 14.3 for each ambient noise level band, with an overall summary encompassing all ambient noise bands presented in Table 14.27.

It can be seen from Table 14.28, that for the Do Minimum situation, the majority, of receptors are predicted subject to an increase in noise nuisance as a result of natural traffic growth, e.g. 450 of 458 residential receptors. All receptors are predicted to fall within the 0 to <10% and 0 to <-10% categories.

Table 14.27: Numbers of Properties Subject to Change in Noise Nuisance for 2025DM v 2010DM, (% of People Bothered by Noise)

Change in Noise Nuisance (%)	Receptor Category		
	Residential	Commercial / Industrial	Community Facilities
>=-40%	0	0	0
-30% to <-40%	0	0	0
-20% to -<30%	0	0	0
-10% to -<20%	0	0	0
0% to <-10%	7	1	2
0% to <10%	428	9	13
10% to <20%	0	0	0
20% to <30%	0	0	0
30% to <40%	0	0	0
>=40%	0	0	0

14.8.3.6 Change in Noise Nuisance for Do Something

For the Do Something scenario, the change in noise nuisance has been considered as a result of the abrupt noise level changes associated with the opening of the scheme, and from those which could arise as a result of gradual increases in traffic over time. For an abrupt increase in noise level, e.g. 2010DS versus 2010DM, the change in noise nuisance for each receptor in the Core Study Area has been identified by comparing the noise level change with the chart of associated change in noise nuisance presented in the DMRB.

For noise level decreases, and gradual noise level increases (e.g. 2025DS versus 2010DM), the change in noise nuisance has been identified for each receptor in the Core Study Area by establishing the noise nuisance associated with each scenario. The difference between the two figures has been identified as the change in percentage of people bothered.

The DMRB requires that noise nuisance changes be classified into specific percentage change bands for each different ambient band presented in Table 14.27. The identified nuisance changes are presented in Appendix 14.3 for each ambient noise level band, with an overall summary encompassing all ambient noise bands presented in Table 14.28.

Table 14.28: Numbers of Properties Subject to Change in Noise Nuisance for 2025DS v 2010DM, (% of People Bothered by Noise)

Change in Noise Nuisance (%)	Receptor Category		
	Residential	Commercial / Industrial	Community Facilities
>=-40%	2	1	0
-30% to <-40%	12	2	1
-20% to -<30%	7	0	1
-10% to -<20%	15	0	1
0% to <-10%	41	1	3
0% to <10%	33	2	3
10% to <20%	0	0	0
20% to <30%	63	1	1
30% to <40%	23	1	1
>=40%	6	0	1

By comparing Tables 14.27 and 14.28, it can be seen that greater changes in noise nuisance are expected for the Do Something Scenario, than the Do Minimum Scenario. This is because the scheme opening would cause an abrupt noise level change. The nuisance change arising from an abrupt change is evaluated following a different method within the DMRB. An abrupt change of 1dB results in a change in noise nuisance of 21% but a change of the same magnitude which is gradual over time results in a nuisance change of only 1 to 3%, depending on the starting and finishing levels.

As such, it is unsurprising that many of the adversely affected receptors fall within the 20 to 30% band, especially as receptors subject to a noise change of <1dB are discounted. This is seen to be the case in Table 14.28 where, like the baseline situation, the majority of receptors are predicted to be subject to an increase in noise nuisance.

Twenty nine residential receptors are predicted subject to an increase of greater than 30% for the DS scenario compared with 0 for the DM scenario, but 36 are predicted to be subject to decreases of greater than 10% for the DS scenario compared with 0 for the DM scenario.

14.8.3.7 Noise Insulation (Scotland) Regulations

Under the Noise Insulation (Scotland) Regulations 1975 some properties may be eligible for noise insulation measures, or a grant in respect thereof, in order to further mitigate the impact of road traffic noise due in part to the scheme. Under these regulations, only residential properties would qualify for such benefits, subject to the qualifying criteria set out in the Section 14.2.

This section highlights that strictly, the noise prediction method to be adopted when determining eligibility is that presented within the *Memorandum on the Noise Insulation (Scotland) Regulations 1975 (NISR), regulations 3 and 6*. This method has been improved over the years, and the methodology contained with CRTN, as adopted in this assessment is more accurate and detailed. As CRTN has been adopted for this assessment, the determined number of qualifying receptors should be considered indicative.

A review of the 2025DS noise model has identified that approximately 45 properties meet the absolute 68dB $L_{A10\ 18hour}$ criteria, are located within 300m of the new or altered highway, have an unobstructed line of sight to the highway, and are predicted subject to an increase in noise level of greater than 1dB.

Approximately this number of properties could therefore qualify for eligibility through the Noise Insulation (Scotland) Regulations as a result of future road traffic noise levels.

14.8.3.8 Vibration

As presented above, when using the DMRB Volume 11 to predict disturbance due to airborne vibration, the methodology should only be applied to properties within 40m of local road traffic routes, and for those subject to noise levels below 58dB $L_{A10\ 18hours,}$ 0% of people should be assumed to be annoyed “very much or quite a lot”.

The change in vibration nuisance has been identified for both the Do Minimum Scenario (2010DM versus 2025DM) and the Do Something Scenario (2010DM

versus 2025DS). The results of these assessments are presented below. In each case, the change in vibration nuisance has been identified using the same methodology as for the corresponding noise assessment presented above. For the vibration assessment, the -10% correction specified in the DMRB has been applied.

The results of these assessments are summarised in Tables 14.29 and 14.30.

Change in Vibration Nuisance for Do Minimum

Table 14.29: Numbers of Properties Subject to Change in Vibration Nuisance for 2025DM v 2010DM, (% of People Bothered by Vibration)

Change in Vibration Nuisance (%)	Receptor Category		
	Residential	Commercial / Industrial	Community Facilities
>-40%	0	0	0
-30% to <-40%	0	0	0
-20% to -<30%	0	0	0
-10% to -<20%	0	0	0
-0.1 to -<10%	0	0	0
0 to <10%	57	4	2
10% to <20%	0	0	0
20% to <30%	0	0	0
30% to <40%	0	0	0
>=40%	0	0	0

Change in Vibration Nuisance for Do Something

Table 14.30: Numbers of Properties Subject to Change in Vibration Nuisance for 2025DM v 2010DM, (% of People Bothered by Noise)

Change in Vibration Nuisance (%)	Receptor Category		
	Residential	Commercial / Industrial	Community Facilities
>-40%	2	1	0
-30% to <-40%	12	2	1
-20% to -<30%	7	0	1
-10% to -<20%	5	0	1
-0.1 to <-10%	1	0	0
0 to <10%	12	1	0
10% to <20%	0	0	0
20% to <30%	6	0	0
30% to <40%	2	0	0
>=40%	0	0	0

It can be seen from Table 14.29, that for the baseline situation, all receptors (57 residential, 4 industrial and 2 commercial) are predicted to be subject to an increase in vibration nuisance between 0 and 10% as a result of natural traffic growth.

For the Do Something scenario (Table 14.30), greater changes in noise nuisance are expected, as the scheme opening will generate an abrupt noise level change. As for noise, the nuisance change arising from an abrupt change is evaluated following a different method within the DMRB. An abrupt change of 1dB results in

a change in vibration nuisance of 21%, but a change of the same magnitude which is gradual over time results in a nuisance change of only 1 to 3%, depending on the starting and finishing levels.

For this scheme, 8 residential receptors are predicted subject to an increase of greater than 10% whilst 26 are predicted subject to a decrease of greater than 10%.

All commercial and industrial receptors except one are predicted subject to a decrease in vibration nuisance,

Overall, greater decreases in vibration nuisance are predicted.

14.9 SUMMARY

The following bullets present a summary of the key results from the assessment.

- A detailed baseline noise survey of the study area identified that the key noise source is local road traffic with additional contribution from helicopter pass-bys and natural sources such as wind rustling vegetation.
- No permanent, e.g. completely non-reversible noise and vibration effects are predicted to arise as a result of the scheme, with identified impacts being classified as either operational, or construction related.
- Noise mitigation design was undertaken as part of the iterative design process for the scheme, resulting in a number of noise mitigation measures being incorporated.
- During the construction phase, temporary noise effects are predicted to arise ranging in significance from minor to moderate.
- During the construction works, where the potential for perceptible vibration levels is identified at local receptors, vibration monitoring would be undertaken to allow effects to be appropriately determined and controlled to within acceptable levels.
- Temporary effects ranging major adverse to major beneficial would arise as a result of localised traffic diversions during the construction phase.
- In general, slightly greater noise level changes are predicted for the 2025DS versus 2010DM scenario compared to the 2010DS versus 2010DM scenario as a result of the inclusion of natural traffic growth.
- In the south-west region of the Core Study Area (in the vicinity of Drumhead), lower noise level changes are predicted for the 2025DS versus 2010DM scenario due to lower traffic flows in this area if the Aberdeen Western Peripheral Route is constructed.
- Within the Core Study Area, the majority of receptors would be subject to minor noise level increases both with and without the scheme.
- Within the Core Study Area, accounting for natural traffic growth and the effect of the scheme, noise effects are predicted to range from >15dB decrease (major beneficial) to between 5 and 10dB increase (major adverse), with the majority of receptors subject to minor noise level increases.
- Within the Core Study Area, accounting for natural traffic growth and the effect of the scheme, 3 industrial receptors are predicted subject to a moderate noise level decrease with no industrial receptors subject to moderate increases, major increases, or major decreases.

- Within the Core Study Area, accounting for natural traffic growth and the effect of the scheme, 2 community facility receptors are predicted subject to moderate noise level increases, 1 subject to minor increases, 2 subject to moderate decreases and 2 subject to major decreases.
- Within the Core Study Area, accounting for natural traffic growth and the effect of the scheme, 20 residential receptors are predicted subject to adverse effects of major significance, 16 subject to adverse effects of moderate significance, 16 subject beneficial effects of moderate significance and 39 subject to beneficial effects of major significance.
- Overall, within the Core Study Area, following the opening of the scheme and including for natural traffic growth, greater noise level decreases are predicted than noise level increases at local receptors.
- Within the Wider Study Area, noise effects as a result of the scheme are predicted to range from minor adverse, to major beneficial. Including for natural traffic growth, effects are predicted to range from moderate adverse to major beneficial.
- Effects at Scheduled Ancient Monuments and Listed Buildings are predicted to range in significance from moderate adverse to major beneficial, with greater beneficial effects being predicted overall.
- For the Core Study Area, the majority of adversely affected receptors are predicted to be subject to a change in noise nuisance of between +20 and +30%, but this is primarily as a result of the scheme opening. Twenty nine receptors are predicted subject to an increase of greater than 30%, with 36 predicted subject to decreases of greater than 10%.
- Approximately 45 properties have been identified which could qualify for noise insulation measures through the provisions of the Noise Insulation (Scotland) Regulations.
- For the Core Study Area, greater numbers of receptors are predicted to be subject to decreases in vibration nuisance than increases. Also, the magnitude of the decreases is generally greater than that associated with the increases.

APPENDIX 14.1

GLOSSARY OF ACOUSTIC TERMINOLOGY

Acoustic Terminology

dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2x10^{-5}$Pa)
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment.
L_{10} & L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings
Façade Level	A sound field determined at a distance of 1m in front of a large sound reflecting object such as a building façade
Ambient Noise Level	The DMRB defines the Ambient noise level as "*the level of noise in the area before the change produced by the scheme under consideration has taken affect. It may include traffic noise as well as noise form other sources*"
Background Noise Level	The noise level exceeded for 90% of the time, the L_{A90} noise index, under ambient conditions (as defined above)

Vibration Terminology

Displacement, Acceleration and Velocity **Root Mean Square (r.m.s.) and Peak Values** **Peak Particle Velocity (PPV)**	Vibration is an oscillatory motion. The magnitude of vibration can be defined in terms of displacement (how far from the equilibrium position that something moves), velocity (how fast something moves), or acceleration (the rate of change of velocity). When describing vibration, one must specify whether peak values are used (i.e. the maximum displacement or maximum velocity) or r.m.s. / r.m.q. values (effectively an average value) are used. Standards for the assessment of building damage are usually given in terms of peak velocity (usually referred to as Peak Particle Velocity, or PPV), whilst human response to vibration is often described in terms of r.m.s. or r.m.q. acceleration
Vibration Dose Value (VDV)	This is a measure of the amount of vibration that is experienced over a specified period, and has been defined so as to quantify the human response to vibration in terms of comfort and annoyance. The Vibration Dose Value is used to assess the likely levels of adverse comment about vibration, and is defined mathematically as the fourth root of the time integral of the fourth power of the acceleration, after it has been frequency weighted to take into account the frequency response of the human body to a vibration stimulus. Measured in units of $ms^{-1.75}$

APPENDIX 14.2

NOISE SURVEY DETAIL INCLUDING FULL TABULATED NOISE MEASUREMENT RESULTS

The following type 1 specification noise measurement equipment was used during the noise survey.

Table A14.1: Noise Measurement Equipment

Equipment	Serial Number
01-dB Stell SIP 95 Data Logging Integrating Sound Level Meter	10565
01-dB Stell PRE 12 N Preamplifier	002557
Microtech Gefell GmbH (Mk 250) condenser Microphone	42589
01dB-Stell Solo Master Data logging Integrating sound level meter	10330
01dB-stell PRE21S 1/2" n Pre-amplifier	10423
MCE212 ½" Microphone	37991
01dB-Stell Solo Master Data logging Integrating sound level meter	10706
01dB-stell PRE21S 1/2" n Pre-amplifier	11662
MCE212 ½" Microphone	57606
01dB-Stell Solo Master Data logging Integrating sound level meter	10717
01dB-stell PRE21S 1/2" n Pre-amplifier	11139
MCE212 ½" Microphone	42448
01dB Type CAL 21 acoustic calibrator	511031290
01dB Type CAL 21 acoustic calibrator	511031263

All sound level meters had been calibrated to traceable standards within the preceding two years and the calibrator within the preceding 12 months.

To establish appropriate measurement locations, the Sub-option 5 route design[200] (the latest version prior to the noise survey), was compared against existing Ordnance Survey mapping for the study area. A 300m distance band was then drawn around proposed new road traffic routes (e.g. the new junction designs and the areas where the main proposed A90 route centre line differed from the existing centre line), and the existing A90 route alignment. Measurement locations were then selected as representative of concentrations of sensitive receptors within the identified area.

In anticipation of potential noise level changes along local traffic routes that are not subject to alteration, two additional noise measurement locations were selected, one in the vicinity of Newburgh, adjacent to the B9000, and one adjacent to the Eigie Road, which passes through Balmedie, see measurement locations 16 and 17 in Section14.1.6 .

[200] i.e. the outline scheme design

Table A14.2: Noise Measurement Data for Measurement Location 1, Free-field, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{ASmax}	L_{AFmax}
28/03/2006 08:10:00	00:05:00	58.5	38.8	56.8	78.9	81.8
28/03/2006 08:15:00	00:05:00	56.1	39.8	56.3	75.9	78.3
28/03/2006 08:20:00	00:05:00	43.9	39.9	46.6	51.3	57.0
28/03/2006 22:33:00	00:05:00	46.8	40.4	49.2	61.6	69.0
28/03/2006 22:38:00	00:05:00	45.7	38.6	49.7	53.4	54.4
28/03/2006 22:43:00	00:05:00	42.2	38.9	44.5	48.1	49.3
29/03/2006 10:06:00	00:05:00	71.3	52.0	60.6	95.6	104.1
29/03/2006 10:11:00	00:05:00	56.3	50.8	58.5	66.7	71.0
29/03/2006 10:16:00	00:05:00	56.1	49.7	57.6	71.2	76.4
29/03/2006 17:09:00	00:05:00	54.6	42.7	52.7	73.0	76.1
29/03/2006 17:14:00	00:05:00	59.6	48.5	62.2	74.8	78.8
29/03/2006 17:19:00	00:05:00	64.8	49.4	66.0	78.3	81.0
29/03/2006 19:00:00	00:05:00	48.3	42.2	51.0	57.4	65.0
29/03/2006 19:05:00	00:05:00	58.7	41.2	60.3	71.6	76.9
29/03/2006 19:10:00	00:05:00	45.3	39.9	48.2	54.7	57.3
30/03/2006 10:00:00	00:05:00	56.0	48.1	51.6	75.4	77.6
30/03/2006 10:05:00	00:05:00	57.5	47.0	50.5	78.9	81.5

Table A14.3: Noise Measurement Data for Measurement Location 2, Free-field, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{ASmax}	L_{AFmax}
27/03/2006 19:00:00	01:00:00	53.4	48.9	55.9	66.7	68.3
27/03/2006 20:00:00	01:00:00	52.4	48.4	52.9	72.0	72.9
27/03/2006 21:00:00	01:00:00	52.4	47.8	55.1	61.4	63.1
27/03/2006 22:00:00	01:00:00	52.2	48.0	54.4	64.3	66.7
27/03/2006 23:00:00	01:00:00	50.9	43.3	54.4	62.4	63.9
28/03/2006 00:00:00	01:00:00	48.6	36.9	52.6	62.5	65.1
28/03/2006 01:00:00	01:00:00	47.3	34.1	50.9	66.9	69.5
28/03/2006 02:00:00	01:00:00	44.4	36.6	48.2	57.6	59.8
28/03/2006 03:00:00	01:00:00	46.0	40.4	48.4	62.6	65.3
28/03/2006 04:00:00	01:00:00	51.6	44.1	55.5	64.8	66.3
28/03/2006 05:00:00	01:00:00	53.6	45.5	57.4	63.3	64.7
28/03/2006 06:00:00	01:00:00	57.0	51.1	59.6	64.9	68.4
28/03/2006 07:00:00	01:00:00	55.1	46.5	59.0	72.3	75.7
28/03/2006 08:00:00	01:00:00	50.5	45.0	51.4	68.1	72.5
28/03/2006 09:00:00	01:00:00	49.9	43.6	52.3	65.5	66.7
28/03/2006 10:00:00	01:00:00	52.7	47.0	54.5	67.8	69.7
28/03/2006 11:00:00	01:00:00	52.5	47.4	55.1	62.6	68.5
28/03/2006 12:00:00	01:00:00	54.8	46.5	54.9	71.4	72.9
28/03/2006 13:00:00	01:00:00	53.0	46.8	53.8	71.7	73.6
28/03/2006 14:00:00	01:00:00	54.5	47.1	54.1	75.6	77.8
28/03/2006 15:00:00	01:00:00	56.6	46.0	54.9	76.3	81.0
28/03/2006 16:00:00	01:00:00	51.6	46.8	53.4	67.6	72.2
28/03/2006 17:00:00	01:00:00	56.5	46.0	54.1	79.9	81.8
28/03/2006 18:00:00	01:00:00	56.1	44.9	53.6	81.1	88.1

Table A14.4: Noise Measurement Data for Measurement Location 3, Free-field, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{ASmax}	L_{AFmax}
28/03/2006 08:36:00	00:05:00	45.0	37.0	48.8	57.6	60.5
28/03/2006 08:41:00	00:05:00	43.8	37.0	47.5	54.2	57.0
28/03/2006 08:46:00	00:05:00	43.0	35.9	46.8	53.0	55.4
28/03/2006 21:23:00	00:05:00	60.4	38.8	51.4	84.4	92.8
28/03/2006 21:28:00	00:05:00	49.5	42.2	53.0	61.7	69.5
28/03/2006 21:33:00	00:05:00	49.3	42.3	52.0	60.8	65.3
29/03/2006 10:32:00	00:05:00	65.8	47.5	71.5	77.3	80.7
29/03/2006 10:37:00	00:05:00	50.6	43.0	53.0	63.7	65.8
29/03/2006 10:42:00	00:05:00	50.8	45.1	53.3	60.3	64.4
29/03/2006 16:27:00	00:05:00	47.3	42.0	50.4	53.9	56.2
29/03/2006 16:32:00	00:05:00	47.2	39.1	50.7	58.5	63.5
29/03/2006 16:37:00	00:05:00	50.0	43.2	51.5	66.5	69.7
29/03/2006 18:16:00	00:05:00	66.9	40.3	65.9	82.6	85.2
29/03/2006 18:21:00	00:05:00	48.4	41.9	52.0	55.7	61.9
29/03/2006 18:26:00	00:05:00	42.8	37.8	45.8	53.3	56.6
30/03/2006 10:26:00	00:05:00	47.2	44.7	49.1	51.3	53.1
30/03/2006 10:31:00	00:05:00	59.9	45.9	61.2	77.2	78.6

Table A14.5: Noise Measurement Data for Measurement Location 4, Free-field, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{ASmax}	L_{AFmax}
28/03/2006 08:57:00	00:05:00	55.0	41.8	48.9	73.7	76.7
28/03/2006 09:02:00	00:05:00	52.5	42.5	53.4	67.6	69.8
28/03/2006 09:07:00	00:05:00	45.6	41.6	47.9	55.1	59.9
28/03/2006 21:43:00	00:05:00	42.2	39.3	44.2	49.0	53.8
28/03/2006 21:48:00	00:05:00	41.8	39.7	43.1	48.3	52.3
28/03/2006 21:53:00	00:05:00	42.3	40.2	44.1	46.3	51.0
29/03/2006 10:51:00	00:05:00	50.0	46.1	51.9	57.8	64.9
29/03/2006 10:56:00	00:05:00	66.1	47.2	61.2	81.8	86.0
29/03/2006 11:01:00	00:05:00	49.7	46.3	52.1	54.9	56.0
29/03/2006 11:06:00	00:05:00	59.8	54.7	63.7	64.9	67.5
29/03/2006 16:46:00	00:05:00	49.0	46.5	50.8	53.0	54.8
29/03/2006 16:51:00	00:05:00	49.9	46.6	51.6	60.0	65.7
29/03/2006 16:56:00	00:05:00	50.7	47.9	52.5	58.3	63.7
29/03/2006 18:36:00	00:05:00	49.8	47.0	51.6	54.1	55.8
29/03/2006 18:41:00	00:05:00	50.3	47.9	52.0	54.4	55.5
29/03/2006 18:46:00	00:05:00	48.8	46.2	50.4	56.0	62.8

Table A14.6: Noise Measurement Data for Measurement Location 5, Free-field, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{AFmax}
28/03/2006 08:15:00	00:05:00	51.1	41.9	50.3	66.9
28/03/2006 08:20:00	00:05:00	49.5	41.4	51.2	65.5
28/03/2006 08:25:00	00:05:00	50.9	43.6	51.7	64.6
28/03/2006 21:24:00	00:05:00	49.7	42.4	50.2	63.3
28/03/2006 21:29:00	00:05:00	50.3	41.5	49.6	68.2
28/03/2006 21:34:00	00:05:00	51.9	41.6	50.7	67.3
29/03/2006 11:53:00	00:05:00	53.1	47.8	56.1	64.4
29/03/2006 11:58:00	00:05:00	64.9	52.1	63.9	83.4
29/03/2006 12:03:00	00:05:00	55.3	49.8	57.9	69.0
29/03/2006 14:25:00	00:05:00	60.6	47.3	63.6	79.2
29/03/2006 14:30:00	00:05:00	52.9	48.3	55.7	63.1
29/03/2006 14:35:00	00:05:00	54.4	47.2	56.2	73.0
29/03/2006 17:25:00	00:05:00	52.3	48.1	52.7	64.2
29/03/2006 17:30:00	00:05:00	52.6	47.6	53.8	66.6
29/03/2006 17:35:00	00:05:00	61.6	48.0	60.1	77.7
30/03/2006 10:46:00	00:05:00	56.4	52.6	58.5	62.3
30/03/2006 10:51:00	00:05:00	56.4	52.3	58.4	66.5

Table A14.7: Noise Measurement Data for Measurement Location 6, Free-field, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{AFmax}
28/03/2006 08:37:00	00:05:00	50.1	47.3	51.5	53.7
28/03/2006 08:42:00	00:05:00	50.7	48.2	52.1	54.3
28/03/2006 08:47:00	00:05:00	50.4	47.4	52.2	54.5
28/03/2006 21:48:00	00:05:00	48.1	44.6	50.5	53.1
28/03/2006 21:53:00	00:05:00	48.8	46.2	50.5	57.0
28/03/2006 21:58:00	00:05:00	48.3	45.5	50.2	53.9
29/03/2006 12:16:00	00:05:00	66.8	50.3	65.5	84.8
29/03/2006 12:21:00	00:05:00	58.6	53.8	61.4	70.1
29/03/2006 12:26:00	00:05:00	65.7	51.5	67.4	83.0
29/03/2006 14:45:00	00:05:00	61.0	50.2	62.1	77.5
29/03/2006 14:50:00	00:05:00	63.9	53.6	67.6	78.9
29/03/2006 17:45:00	00:05:00	54.2	46.1	54.2	73.0
29/03/2006 17:50:00	00:05:00	51.8	49.1	53.4	57.1
29/03/2006 17:55:00	00:05:00	57.9	47.4	52.2	80.6

Table A14.8: Noise Measurement Data for Measurement Location 7, Free-field, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{AFmax}
28/03/2006 09:00:00	00:05:00	50.7	37.4	56.5	60.7
28/03/2006 09:05:00	00:05:00	46.3	35.3	48.7	60.8
28/03/2006 09:10:00	00:05:00	39.3	35.6	40.0	52.1
28/03/2006 22:10:00	00:05:00	48.3	39.8	50.4	63.5
28/03/2006 22:15:00	00:05:00	50.5	39.9	51.0	67.5
28/03/2006 22:20:00	00:05:00	54.1	44.3	55.8	69.8
29/03/2006 12:37:00	00:05:00	57.0	49.8	60.5	69.3
29/03/2006 12:42:00	00:05:00	56.4	42.9	60.5	74.4
29/03/2006 12:47:00	00:05:00	58.6	43.8	61.1	76.4
29/03/2006 15:06:00	00:05:00	56.9	41.9	58.5	76.2
29/03/2006 15:11:00	00:05:00	65.3	44.4	66.9	83.0
29/03/2006 15:16:00	00:05:00	54.8	43.6	58.0	70.3
29/03/2006 18:05:00	00:05:00	56.5	37.9	48.5	78.5
29/03/2006 18:10:00	00:05:00	42.3	36.8	45.7	51.5
29/03/2006 18:15:00	00:05:00	56.9	36.9	52.8	76.9
30/03/2006 11:04:00	00:05:00	49.0	45.2	51.0	53.9
30/03/2006 11:09:00	00:05:00	49.6	45.4	53.2	59.1

Table A14.9: Noise Measurement Data for Measurement Location 8, Free-field, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{AFmax}
28/03/2006 09:22:00	00:05:00	53.7	46.8	53.5	72.7
28/03/2006 09:27:00	00:05:00	69.2	47.7	67.2	86.4
28/03/2006 09:32:00	00:05:00	48.6	45.9	50.4	54.3
28/03/2006 22:33:00	00:05:00	48.5	43.0	51.5	56.1
28/03/2006 22:38:00	00:05:00	48.5	44.9	50.8	54.5
28/03/2006 22:43:00	00:05:00	49.5	45.4	51.7	55.3
29/03/2006 12:58:00	00:05:00	55.6	49.0	56.3	73.9
29/03/2006 13:03:00	00:05:00	58.9	51.2	61.1	78.3
29/03/2006 13:08:00	00:05:00	59.5	52.4	62.1	78.1
29/03/2006 15:26:00	00:05:00	59.1	49.8	55.1	82.3
29/03/2006 15:31:00	00:05:00	56.6	49.4	58.7	72.7
29/03/2006 15:36:00	00:05:00	62.1	48.8	54.3	85.3
29/03/2006 18:26:00	00:05:00	60.4	48.6	54.6	80.6
29/03/2006 18:31:00	00:05:00	56.3	49.8	54.5	75.7
29/03/2006 18:36:00	00:05:00	58.5	48.6	54.4	80.2

Table A14.10: Noise Measurement Data for Measurement Location 9, Free-field, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{ASmax}	L_{AFmax}
28/03/2006 09:23:00	00:05:00	69.4	50.7	65.3	88.7	90.9
28/03/2006 09:28:00	00:05:00	53.5	50.9	55.0	58.2	63.8
28/03/2006 09:33:00	00:05:00	51.5	48.8	53.2	55.2	56.9
28/03/2006 22:08:00	00:05:00	54.0	49.5	56.6	62.9	66.0
28/03/2006 22:13:00	00:05:00	53.1	48.8	55.7	59.4	61.7
28/03/2006 22:18:00	00:05:00	52.1	48.4	54.5	56.5	61.0
29/03/2006 11:15:00	00:05:00	57.5	50.9	59.8	72.3	74.4
29/03/2006 11:20:00	00:05:00	59.1	53.8	62.2	64.3	67.8
29/03/2006 11:25:00	00:05:00	58.4	52.5	59.9	73.6	76.7
29/03/2006 16:02:00	00:05:00	58.3	53.6	61.1	64.9	71.6
29/03/2006 16:07:00	00:05:00	58.5	53.5	61.0	67.0	69.8
29/03/2006 16:12:00	00:05:00	60.9	56.0	63.6	68.8	71.2
29/03/2006 17:37:00	00:05:00	56.3	52.9	58.4	61.1	63.3
29/03/2006 17:42:00	00:05:00	54.9	52.5	56.6	60.8	63.0
29/03/2006 17:47:00	00:05:00	56.0	51.6	58.0	65.3	70.0

Table A14.11: Noise Measurement Data for Measurement Location 10, Free-field, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{ASmax}	L_{AFmax}
27/03/2006 20:00:00	01:00:00	73.5	58.1	77.7	87.4	90.2
27/03/2006 21:00:00	01:00:00	71.4	55.1	76.0	83.0	85.0
27/03/2006 22:00:00	01:00:00	70.9	53.2	75.8	84.6	86.9
27/03/2006 23:00:00	01:00:00	67.1	47.7	70.9	82.2	83.8
28/03/2006 00:00:00	01:00:00	63.9	41.1	67.1	79.1	80.9
28/03/2006 01:00:00	01:00:00	61.6	37.5	61.5	80.6	82.5
28/03/2006 02:00:00	01:00:00	58.9	40.7	57.4	78.3	79.9
28/03/2006 03:00:00	01:00:00	58.0	40.0	55.5	77.7	79.6
28/03/2006 04:00:00	01:00:00	63.1	45.1	65.1	79.5	82.0
28/03/2006 05:00:00	01:00:00	67.6	48.2	72.8	82.0	83.5
28/03/2006 06:00:00	01:00:00	75.3	61.1	78.8	82.4	84.4
28/03/2006 07:00:00	01:00:00	77.0	70.3	79.9	83.9	85.5
28/03/2006 08:00:00	01:00:00	76.0	65.2	79.5	84.1	85.4
28/03/2006 09:00:00	01:00:00	75.0	62.0	78.8	83.1	85.0
28/03/2006 10:00:00	01:00:00	74.7	61.0	78.5	83.9	85.9
28/03/2006 11:00:00	01:00:00	75.0	62.9	78.6	83.5	85.2
28/03/2006 12:00:00	01:00:00	75.3	64.2	78.8	83.1	84.8
28/03/2006 13:00:00	01:00:00	75.5	63.8	79.0	83.1	84.7
28/03/2006 14:00:00	01:00:00	75.6	65.3	79.1	83.5	86.5
28/03/2006 15:00:00	01:00:00	76.7	66.8	80.1	84.2	85.6
28/03/2006 16:00:00	01:00:00	77.8	70.1	80.8	84.4	86.1
28/03/2006 17:00:00	01:00:00	77.9	69.9	80.9	88.3	92.1

Table A14.12: Noise Measurement Data for Measurement Location 11, Free-field, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{AFmax}
28/03/2006 14:00:00	01:00:00	73.6	84.4	62.1	78.5
28/03/2006 15:00:00	01:00:00	73.7	84.5	63.3	78.2
28/03/2006 16:00:00	01:00:00	73.7	89.2	65.1	77.9

Table A14.13: Noise Measurement Data for Measurement Location 12, Free-field, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{ASmax}	L_{AFmax}
28/03/2006 09:57:00	01:00:00	71.9	59.4	75.4	82.3	85.5
28/03/2006 10:57:00	01:00:00	72.9	59.6	76.3	82.1	87.6
28/03/2006 11:57:00	01:00:00	73.2	60.7	76.4	81.9	83.2

Table A14.14: Noise Measurement Data for Measurement Location 13, Free-field, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{ASmax}	L_{AFmax}
28/03/2006 19:00:00	01:00:00	73.7	53.5	78.3	87.9	92.5
28/03/2006 20:00:00	01:00:00	72.5	51.2	77.7	86.9	90.4
28/03/2006 21:00:00	01:00:00	71.7	49.3	76.6	96.9	101.5
28/03/2006 22:00:00	01:00:00	70.2	49.3	76.0	84.0	86.5
28/03/2006 23:00:00	01:00:00	66.7	45.1	66.8	83.5	86.3
29/03/2006 00:00:00	01:00:00	64.5	38.0	61.0	84.9	88.4
29/03/2006 01:00:00	01:00:00	62.7	30.6	57.0	85.6	88.3
29/03/2006 02:00:00	01:00:00	62.7	29.7	57.5	84.0	87.1
29/03/2006 03:00:00	01:00:00	60.2	26.6	53.2	83.0	85.5
29/03/2006 04:00:00	01:00:00	65.5	24.4	61.3	83.2	86.9
29/03/2006 05:00:00	01:00:00	70.7	42.1	76.0	84.6	87.8
29/03/2006 06:00:00	01:00:00	75.0	61.4	78.8	85.0	88.8
29/03/2006 07:00:00	01:00:00	75.7	60.0	79.5	85.3	88.2
29/03/2006 08:00:00	01:00:00	76.0	58.1	79.7	86.3	89.2
29/03/2006 09:00:00	01:00:00	75.4	57.2	79.3	86.0	88.2
29/03/2006 10:00:00	01:00:00	75.0	55.7	79.4	88.8	91.6
29/03/2006 11:00:00	01:00:00	74.5	57.8	78.8	86.1	89.1
29/03/2006 12:00:00	01:00:00	74.3	56.9	78.5	84.7	88.6
29/03/2006 13:00:00	01:00:00	74.9	59.0	78.8	87.6	90.3
29/03/2006 14:00:00	01:00:00	74.9	59.4	78.8	86.4	88.6
29/03/2006 15:00:00	01:00:00	74.9	60.5	78.7	89.0	91.8
29/03/2006 16:00:00	01:00:00	75.9	63.3	79.2	91.9	95.3
29/03/2006 17:00:00	01:00:00	76.0	63.4	79.5	87.2	90.5
29/03/2006 18:00:00	01:00:00	75.9	60.3	79.1	97.3	101.6

Table A14.15: Noise Measurement Data for Measurement Location 14, Free-field, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{AFmax}
29/03/2006 10:15:00	01:00:00	68.9	53.1	72.6	85.6
29/03/2006 11:15:00	01:00:00	68.1	53.2	72.0	80.5
29/03/2006 12:15:00	01:00:00	68.8	54.7	72.3	86.5

Table A14.16: Noise Measurement Data for Measurement Location 15, Free-field, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{ASmax}	L_{AFmax}
28/03/2006 20:00:00	01:00:00	68.0	50.6	72.3	78.8	80.6
28/03/2006 21:00:00	01:00:00	66.3	47.7	70.9	77.9	79.3
28/03/2006 22:00:00	01:00:00	65.6	46.3	70.3	81.1	83.3
28/03/2006 23:00:00	01:00:00	62.0	39.3	67.3	76.8	78.4
29/03/2006 00:00:00	01:00:00	59.3	29.5	61.6	77.4	79.8
29/03/2006 01:00:00	01:00:00	57.3	24.9	54.6	76.8	78.3
29/03/2006 02:00:00	01:00:00	58.0	27.5	56.4	76.4	78.3
29/03/2006 03:00:00	01:00:00	56.1	22.1	54.7	75.2	76.8
29/03/2006 04:00:00	01:00:00	61.4	26.7	65.1	76.7	79.0
29/03/2006 05:00:00	01:00:00	67.5	43.2	72.6	77.4	79.1
29/03/2006 06:00:00	01:00:00	72.6	64.9	75.2	81.0	83.1
29/03/2006 07:00:00	01:00:00	72.5	63.8	75.3	78.5	79.6
29/03/2006 08:00:00	01:00:00	72.1	63.1	74.9	77.9	79.2
29/03/2006 09:00:00	01:00:00	70.3	57.9	73.5	77.4	78.9
29/03/2006 10:00:00	01:00:00	65.5	53.6	69.4	76.3	79.4
29/03/2006 11:00:00	01:00:00	64.9	51.9	69.1	75.2	77.5
29/03/2006 12:00:00	01:00:00	67.2	55.3	70.7	82.9	85.5
29/03/2006 13:00:00	01:00:00	68.3	56.8	71.8	76.6	78.9
29/03/2006 14:00:00	01:00:00	67.9	56.3	71.5	79.6	81.6
29/03/2006 15:00:00	01:00:00	67.9	55.2	71.5	76.4	78.5
29/03/2006 16:00:00	01:00:00	68.7	59.4	71.9	77.3	79.1
29/03/2006 17:00:00	01:00:00	69.7	60.5	72.8	78.0	80.0
29/03/2006 18:00:00	01:00:00	69.6	59.7	72.8	76.7	78.7

Table A14.17: Noise Measurement Data for Measurement Location 16, Free-field, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{ASmax}	L_{AFmax}
28/03/2006 13:41:00	01:00:00	63.3	50.9	67.2	81.5	83.6
28/03/2006 14:41:00	01:00:00	64.7	50.9	66.2	93.9	100.8
28/03/2006 15:41:00	01:00:00	62.6	52.8	66.7	79.1	82.7

Table A14.18: Noise Measurement Data for Measurement Location 17, Free-field, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{AFmax}
29/03/2006 14:00:00	01:00:00	59.6	76.6	48.9	62.0
29/03/2006 15:00:00	01:00:00	61.6	79.2	47.7	65.0
29/03/2006 16:00:00	01:00:00	59.9	77.3	46.2	63.1

APPENDIX 14.3

ASSESSMENT RESULTS CATEGORISAED ACCORDING TO 2010DM AMBIENT NOISE LEVEL BANDS

Table A14.19: Summary Impact Table for <50dB $L_{A10\ 18hour}$ Ambient Noise Bands, based on 2010DM Noise Levels

Assessment Category		Receptor Type					
		Residential		Commercial / Industrial		Community Facilities	
		DS	DM	DS	DM	DS	DM
Noise Level Increase	1 to <3	1	4	0	0	0	1
	3 to <5	3	0	0	0	0	0
	5 to <10	1	0	0	0	1	0
	10 to <15	0	0	0	0	0	0
	<15	0	0	0	0	0	0
Increase in Noise Nuisance	<10%	0	4	N/A	N/A	N/A	N/A
	10 to <20%	0	0	N/A	N/A	N/A	N/A
	20 to < 30%	1	0	N/A	N/A	N/A	N/A
	30 to <40%	2	0	N/A	N/A	N/A	N/A
	>=40%	1	0	N/A	N/A	N/A	N/A
Noise Level Decrease	1<3	0	0	0	0	0	0
	3<5	0	0	0	0	0	0
	5<10	0	0	0	0	0	0
	10<15	0	0	0	0	0	0
	<15	0	0	0	0	0	0
Decrease in Noise Nuisance	<10%	0	0	N/A	N/A	N/A	N/A
	10 to <20%	0	0	N/A	N/A	N/A	N/A
	20 to < 30%	0	0	N/A	N/A	N/A	N/A
	30 to <40%	0	0	N/A	N/A	N/A	N/A
	>=40%	0	0	N/A	N/A	N/A	N/A

Table A14.20: Summary Impact Table for 50 to <60dB $L_{A10\ 18hour}$ Ambient Noise Bands, based on 2010DM Noise Levels

Assessment Category		Receptor Type					
		Residential		Commercial / Industrial		Community Facilities	
		DS	DM	DS	DM	DS	DM
Noise Level Increase	1 to <3	227	263	1	2	3	6
	3 to <5	13	0	1	0	1	0
	5 to <10	19	0	0	0	1	0
	10 to <15	0	0	0	0	0	0
	<15	0	0	0	0	0	0
Increase in Noise Nuisance	<10%	5	264	N/A	N/A	N/A	N/A
	10 to <20%	0	0	N/A	N/A	N/A	N/A
	20 to < 30%	33	0	N/A	N/A	N/A	N/A
	30 to <40%	21	0	N/A	N/A	N/A	N/A
	>=40%	5	0	N/A	N/A	N/A	N/A
Noise Level Decrease	1<3	6	2	0	0	1	1
	3<5	6	1	0	0	1	0
	5<10	0	0	0	0	0	0
	10<15	0	0	0	0	0	0
	<15	0	0	0	0	0	0
Decrease in Noise Nuisance	<10%	11	2	N/A	N/A	N/A	N/A
	10 to <20%	0	0	N/A	N/A	N/A	N/A
	20 to < 30%	0	0	N/A	N/A	N/A	N/A
	30 to <40%	0	0	N/A	N/A	N/A	N/A
	>=40%	0	0	N/A	N/A	N/A	N/A

Table A14.21: Summary Impact Table for 60 to <70dB $L_{A10\ 18hour}$ Ambient Noise Bands, based on 2010DM Noise Levels

Assessment Category		Receptor Type					
		Residential		Commercial / Industrial		Community Facilities	
		DS	DM	DS	DM	DS	DM
Noise Level Increase	1 to <3	110	114	2	3	3	5
	3 to <5	0	0	0	0	0	0
	5 to <10	0	0	0	0	0	0
	10 to <15	0	0	0	0	0	0
	<15	0	0	0	0	0	0
Increase in Noise Nuisance	<10%	21	114	N/A	N/A	N/A	N/A
	10 to <20%	0	0	N/A	N/A	N/A	N/A
	20 to < 30%	25	0	N/A	N/A	N/A	N/A
	30 to <40%	0	0	N/A	N/A	N/A	N/A
	>=40%	0	0	N/A	N/A	N/A	N/A
Noise Level Decrease	1<3	16	5	0	1	0	0
	3<5	9	0	1	0	2	1
	5<10	16	0	0	0	1	0
	10<15	1	0	0	0	0	0
	<15	0	0	0	0	0	0
Decrease in Noise Nuisance	<10%	29	5	N/A	N/A	N/A	N/A
	10 to <20%	13	0	N/A	N/A	N/A	N/A
	20 to < 30%	0	0	N/A	N/A	N/A	N/A
	30 to <40%	0	0	N/A	N/A	N/A	N/A
	>=40%	0	0	N/A	N/A	N/A	N/A

Table A14.22: Summary Impact Table for >70dB $L_{A10\ 18hour}$ Ambient Noise Bands, based on 2010DM Noise Levels

Assessment Category		Receptor Type					
		Residential		Commercial / Industrial		Community Facilities	
		DS	DM	DS	DM	DS	DM
Noise Level Increase	1 to <3	21	46	1	4	0	1
	3 to <5	0	0	0	0	0	0
	5 to <10	0	0	0	0	0	0
	10 to <15	0	0	0	0	0	0
	<15	0	0	0	0	0	0
Increase in Noise Nuisance	<10%	7	46	N/A	N/A	N/A	N/A
	10 to <20%	0	0	N/A	N/A	N/A	N/A
	20 to < 30%	4	0	N/A	N/A	N/A	N/A
	30 to <40%	0	0	N/A	N/A	N/A	N/A
	>=40%	0	0	N/A	N/A	N/A	N/A
Noise Level Decrease	1<3	1	0	0	0	0	0
	3<5	1	0	0	0	0	0
	5<10	2	0	0	0	1	0
	10<15	15	0	1	0	1	0
	<15	5	0	2	0	1	0
Decrease in Noise Nuisance	<10%	1	0	N/A	N/A	N/A	N/A
	10 to <20%	2	0	N/A	N/A	N/A	N/A
	20 to < 30%	7	0	N/A	N/A	N/A	N/A
	30 to <40%	12	0	N/A	N/A	N/A	N/A
	>=40%	2	0	N/A	N/A	N/A	N/A

15 AIR QUALITY

15.1 INTRODUCTION

This chapter presents the findings of an assessment of the potential air quality effects of the proposals during both the construction and operational phases. For both phases the type, source and significance of the potential impacts are identified, and the measures that would be employed to minimise these impacts are described and residual effects discussed.

As the proposals relate to a road scheme, the assessment has been carried out in accordance with Stages 1-3 of the assessment procedure given in the Design Manual for Roads and Bridges (DMRB)[201] and associated guidance including the Scottish Transport Analysis Guidance[202].

The scope of the assessment includes an assessment of dust impacts during the construction phase and the calculation of total emissions and local concentrations of air pollutants during operation of the scheme. The scheme is not located close to an Air Quality Management Area (AQMA)[203] (see Section 15.2.1) and the Stage 2 DMRB assessment[204] concluded that further detailed modelling of local concentrations was not required because the potential impacts of the scheme were shown to not have any significant effects on local air quality. Therefore the assessment of local concentrations within this chapter has been carried out using the method specified in Stage 2 of the DMRB assessment procedure.

The study area comprises properties within 200m of both the existing (A90) route and the proposed realigned (A90(T)) route.

Appendix 15.1 provides a glossary of air quality terms used in this chapter.

15.2 LEGISLATIVE FRAMEWORK

15.2.1 The Air Quality Strategy and Regulations

The main requirements for air quality are in relation to compliance with national standards. The principal air quality standards applied in Scotland are the standards and objectives of the Air Quality (Scotland) Regulations[205] and its Amendment in 2002[206] which were enacted as part of the UK Air Quality Strategy (AQS)[207] under Section 80 of the Environment Act 1995.

The standards and objectives applicable in Scotland and most relevant to this assessment are summarised in Table 15.1.

[201] Volume 11, Section 3, Part 1 Air Quality (Highways Agency, February 2003)
[202] Interim Advice Note 54/04 Revision to 'GOMMMS' Local Air Quality Assessment procedure in DMRB 11.3.1 and Webtag Transport Analysis Guidance (TAG) Department of Transport June 2003
[203] The closest AQMA is in Aberdeen City (Steer Davies Gleave, 2007. Regional Transport Strategy 2021. Strategic Environmental Assessment. NESTRANS, March 2007.
[204] Transport Scotland, 2006. A90 Balmedie to Tipperty, Stage 2 Addendum Report. November 2006
[205] The Air Quality (Scotland) Regulations 2000, Scottish Statutory Instrument 2000 No.97
[206] The Air Quality (Scotland) Amendment Regulations 2002, Scottish Statutory Instrument 2002 No. 297
[207] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland- Working Together for Clean Air- January 2000

Table 15.1: Relevant Air Quality Standards and Objectives

Pollutant	Objective	Concentration measured as	Date to be achieved
Nitrogen dioxide (NO_2)	200µg/m^3 not to be exceeded more than 18 times a year	1 hour mean	31 December 2005
	40µg/m^3	Annual mean	31 December 2005
Particles (PM_{10})	50µg/m^3 not to be exceeded more than 35 times a year	24 hour mean	31 December 2004
	40µg/m^3	Annual mean	31 December 2004
	50µg/m^3 not to be exceeded more than 7 times a year	24 hour mean	31 December 2010
	18µg/m^3	Annual mean	31 December 2010

Pollutants 'standards' relate to ambient pollutant concentrations in air and are set on the basis of medical and scientific evidence of how each pollutant affects human health. Pollutant 'objectives', however, are future dates by which each standard is to be achieved, taking into account economic considerations, practicability and technical feasibility.

There are no statutory standards or objectives relating to nuisance dust, however, under the Environmental Protection Act (1990) a local authority must serve an abatement notice where a statutory nuisance is identified.

Under Part IV of the Environment Act 1995, local authorities must review and document local air quality within their area by way of staged appraisals and respond accordingly, with the aim of meeting the air quality objectives by the years defined in the Regulations. Where the objectives of the Air Quality Regulations are not likely to be achieved by the objective year, an authority is required to designate an AQMA. For each AQMA the local authority is required to draw up an Air Quality Action Plan (AQAP) to secure improvements in air quality and show how it intends to work towards achieving air quality standards in the future.

Aberdeenshire Council has completed two stages of this review and assessment process and not declared any AQMAs within its area as concentrations of all pollutants assessed were found to be in compliance with the relevant objectives.

15.3 SOURCES OF INFORMATION

The following information was used to complete the assessment;

- review and Assessment Reports produced by Aberdeenshire Council[208] and Aberdeen City Council[209], which were reviewed to gain an understanding of local air quality in the area of the scheme and to obtain results from local monitoring;
- air quality data for the area surrounding the site, including data from the National Air Quality Information Archive (NAQIA)[210];

[208] Air Quality Screening Assessment for Aberdeenshire Council, August 2006
[209] Local Air Quality Management Detailed Assessment, A Report for Aberdeen City Council, August 2004
[210] http://www.airquality.co.uk

- maps to confirm the number and location of nearby areas that may be sensitive to changes in local air quality; and
- traffic flow data provided by Grontmij.

15.4 CONSULTATIONS

The Environmental Health Department at Aberdeenshire Council was consulted regarding the scope and approach to the assessment. The Council was in general support of the approach to the assessment. Fountainbleau, the Cock and Bull Public House and Foveran School were put forward as sensitive locations in the study area to be considered in the evaluation (see Figure 6.1a-e). It was also noted that there is a current planning application for a quarry at South Orrock, and a large golfing resort is being planned in the area, both of which could lead to increases in the volume of traffic if consented in the future. These comments have been taken account of in the completed assessment.

15.5 BASELINE

Air quality within the study corridor is good (see Section 15.2.1). Concentrations of all pollutants considered in this review work were found to be well below statutory objectives.

No monitoring of pollution concentrations has been undertaken by Aberdeenshire Council close to the study corridor. This is because air quality in this area is good i.e. considerably below the relevant AQS standards and objectives and therefore there has been no need to gather detailed information on precise pollution levels to support management measures to improve air quality.

Air quality within the study corridor will be influenced by traffic on the A90 as there are no other major roads or sources of pollution nearby. Background concentrations of nitrogen dioxide (NO_2) and particulate matter (PM_{10}) taken from the January 2006 update on the National Air Quality Information Archive for 2005 and 2010 are given in Table 15.2. Concentrations given in the table are for OS grid location (97500, 23500) which is located to the south of Foveran approximately 300 m to the east of the existing A90. Background concentrations of oxides of nitrogen (NOx) are also given as these were used in the calculations undertaken in the assessment of impacts.

Table 15.2: Background Pollution Concentrations taken from the National Air Quality Information Archive

Pollutant	Year	
	2005	2010
NOx	4.3µg/m^3	3.3µg/m^3
NO_2	3.4µg/m^3	2.3µg/m^3
PM_{10}	10.8µg/m^3	10.3µg/m^3

The background concentrations in 2005 are well below the annual mean statutory objectives for both NO_2 and PM_{10} which are 40µg/m^3 to be achieved by 2005 and 2004 respectively. Concentrations are expected to have improved further by 2010, by which time an annual mean objective of 18µg/m^3 will apply for PM_{10} concentrations only, and background concentrations will easily meet this objective.

15.6 ASSESSMENT METHODOLOGY

15.6.1 Construction

A generic assessment of the effects on local air quality in terms of construction impacts (dust/particulate generation) was undertaken using recent publications and guidance[211,212,213]. This considered likely sources of dust, the distance from the point of generation to sensitive receptors, the prevailing weather conditions and the effectiveness of dust control measures.

15.6.2 Operation

The main impacts during operation of the scheme would be changes in the total emissions of global pollutants including carbon dioxide (CO_2) which have no direct impact on human health but are considered to be greenhouse gases, and changes in the local concentrations of pollutants. The main pollutants of concern with regard to local air quality and road traffic are generally considered to be NO_2, PM_{10}, carbon monoxide (CO) and benzene (C_6H_6). These pollutants have standards and objectives set for them in the AQS due to their impact on human health. Of these pollutants, emissions of NO_2 and PM_{10} are most likely to result in exceedences of the relevant air quality standards or objectives, this assessment therefore only considers local concentrations of these two pollutants.

15.6.2.1 Total Emissions

The changes in total emissions of pollutants have been calculated using the 'Regional' application of the DMRB spreadsheet. This uses data for traffic flows, link length, speeds and road types to calculate the total emissions of pollutants.

15.6.2.2 Local Concentrations of Air Pollutants

Assessment of the changes in local concentrations of pollutants was undertaken using the methodology described in DMRB for a Stage 2 assessment, and the DMRB spreadsheet. This involves explaining the air quality implications of the route option, undertaking a property count, producing a constraints map showing those properties which might be affected by changes in air quality, a quantitative assessment of the change in people's exposure to PM_{10} and NO_2 and estimating pollutant concentrations in the assessment years both with and without the proposals.

Property Count

The number of properties within 200m of the scheme was counted and categorised into bands of 0-50m, 50-100m, 100-150m and 150m to 200m[214]. The number of properties likely to experience an improvement or deterioration in air quality has been calculated by counting the number of properties that would become closer or further away from the main carriageway as a result of the scheme. Those properties which become closer are assumed to experience a

[211] Kukadia, V. Upton, S. L. and Hall, D. J. 2003. Control of dust from Construction and Demolition Activities. BRE

[212] Quality of Urban Air Review Group 1996. Airborne Particulate Matter in the United Kingdom – Third Report of the Quality of Urban Air Review Group. Prepared for the Department of the Environment

[213] Arup Environmental and Ove Arup and Partners. 1995 The Environmental Effects of dust from Surface Mineral Workings Volume 2. Prepared for Department of the Environment Minerals Division

[214] NB The property count undertaken for the Stage 3 EIA work has refined the counts undertaken for the Stage 2 Addendum and thus there may be a small discrepancy between the counts in this chapter and those in other sections of the ES but these are not significant and would not change the general findings of the assessment

deterioration in air quality. Those which become further away are assumed to experience an improvement in air quality.
The properties recorded in the property count include residential properties, schools and public houses but not other commercial properties. These are all locations where members of the public could be present over the averaging periods of the AQS objectives for NO_2 and PM_{10}.

Change in Exposure

A quantitative assessment of the change in people's exposure to PM_{10} and NO_2 was carried out. These changes in people's exposure are also referred to as 'route assessment scores', a positive score indicates an increase in concentrations (i.e. a deterioration in air quality) and a negative number indicates a decrease in concentrations (i.e. improvement in air quality). Calculation sheets for the route assessment scores are included in Appendix 15.3.

Concentrations at representative properties were assessed using DMRB methodology.

The following properties were selected for further investigation of localised pollution effects: The Cock and Bull Public House, Dambrae, Southlea, Kirkhill, Foveran School and Fountainbleau. These properties are considered representative of properties along the route of the proposed scheme and the estimated concentrations for these locations would be representative of other locations along the route. The location of these properties is shown in Figure 15.1.

Calculations of emissions and local concentrations have been undertaken for a baseline year of 2005 and 2010, the scheme opening year. The design year for the proposed route alignment of 2025 was not assessed due to the uncertainties involved with predicting air quality concentrations with any accuracy for that far in the future.

No air quality monitoring data are available close to the scheme and so estimated local air quality concentrations have not been verified or compared to such data. Given that air quality in the study corridor is good, low background concentrations can be assumed. If this is taken into account together with the small impact of the scheme predicted in Section 15.9 it is not considered that this would have altered the assessment of significance or the overall results of the assessment.

The DMRB methodology does not give significance criteria to assess air quality impacts. It does however require a qualitative comment in the following situations:

- the proposed scheme leads to an increase in annual mean PM10 of at least 1µg/m3;
- the proposed scheme leads to an increase in annual mean NO2 of at least 2µg/m3, and where concentrations are above the AQS NO2 objective of 40µg/m3; and
- the proposed scheme is likely to affect air quality in an Air Quality Management Area (AQMA), and state what the effect is (not relevant for this scheme see Section 15.5).

15.7 POTENTIAL IMPACTS

15.7.1 Permanent

There are no permanent impacts associated with scheme construction. Impacts would be associated with emissions from vehicles using the new route alignment once operational, however these will decrease with time as fuel and vehicle technology improves resulting in 'cleaner' emissions.

15.7.2 Construction

- Construction processes on the site could lead to the generation and release of dust. Dust may be deposited in the area immediately surrounding the source (up to 200m away) and could cause nuisance or amenity loss;
- levels of PM_{10} in the locality would be elevated as a result of construction processes and construction traffic; and
- construction traffic could cause a deterioration of air quality in the areas immediately adjacent to the principal means of access for construction traffic.

15.7.3 Operational

- Changes in total emissions of pollutants; and
- changes in local concentrations of air pollutants.

15.8 MITIGATION MEASURES

Mitigation measures have been identified to address the potentially significant impacts outlined in Section 15.7.

15.8.1 Construction Phase

The following are measures which would be employed to reduce negative impacts during the construction phase of the development.

AQ1. All vehicles carrying loose aggregate and workings would be sheeted at all times where these could give rise to dust at nearby properties.

AQ2. Design controls for construction equipment and vehicles and use of appropriately designed vehicles for materials handling would be implemented.

AQ3. Completed earthworks would be covered or vegetated as soon as practicable.

AQ4. The site would be regularly inspected and site boundaries checked for dust deposits (which would be removed where necessary). In addition local roads would be cleaned when necessary.

AQ5. Surface areas of open stockpiles would be minimised (subject to health and safety, soil storage and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick up.

AQ6. Dust-suppression tools would be used for all operations.

AQ7. All construction plant and equipment would be maintained in good working order and not left running when in use.

AQ8. Onsite-movements would be restricted to well within the site and not near the perimeter, wherever possible.

AQ9. There would be no unauthorised burning of any material anywhere on site.

AQ10. Liaison with the council would be maintained throughout the construction process.

15.9 ASSESSMENT OF RESIDUAL EFFECTS

15.9.1 Construction

There would be some residual effects as a result of construction. However, the impacts of releases of dust generated by construction processes would be localised. This is due to the fact that dust is relatively heavy and falls from suspension in the atmosphere within a short time following release. As a result the greatest potential for nuisance problems to occur would be within 200m of the construction site perimeter. Approximately 206 properties are located within 200m of the proposed scheme. The prevailing wind direction at the site is from the west, therefore properties to the east of construction activities are most likely to experience nuisance. There are approximately 149 properties to the east of the scheme within 200m.

The potential for short term releases of PM_{10} from materials handling and site plant would remain following mitigation. As the magnitude of these releases is relatively small, any adverse effects resulting from them are likely to be relatively short-term with negligible effect outside the site boundary (i.e. not significant).

Given the volume of traffic associated with the construction phase this traffic would not have a significant effect on local air quality. The overall adverse effect of the proposed scheme on dust and PM_{10} is considered to be minor (not significant).

15.9.2 Operational

15.9.2.1 Total Emissions

Table 15.3 below presents the calculated total emissions of NO_x from the scheme. It considers baseline emissions in both 2005 and 2010 and presents total emissions with the scheme operational in 2010. Emissions of total pollutants, particularly NOx and CO_2 are important because they contribute to transboundary pollution, and in the case of CO_2 has an effect on climate change.

Table 15.3: Regional Air Quality

A90(T) Present Year: 2005 Future Year: 2010 Tonnes per Year					
	Do-Minimum		Do-Something	Do-Something compared with	
	Present	Future	Future	Present Do-Min	Future Do-Min
NO_x	170.8	123.1	133.3	- 37.5	10.1

Data Sources: DMRB Screening method version 1.02 (November 2003)

Qualitative comments: Total NO_x emissions are predicted to decrease between 2005 and 2010. Total emissions with the scheme operational in 2010 are predicted to increase from the 2010 baseline, however are still a reduction from the 2005 baseline because of improvements in fuel and vehicle technology.

Table 15.4 below presents the calculated total emissions of CO_2 from the scheme. It considers baseline emissions in both 2005 and total emissions with the scheme in 2010. CO_2 is of concern as it is one of the main atmospheric gases that contribute to the greenhouse effect.

Table 15.4: Environment Greenhouse Gases

A(90)(T) Year: 2010 Tonnes per Year					
Do-minimum			Do-Something	Do Something as % of	
	Present	Future		Present Do-Min	Future Do-Min
CO_2	27,021	27,947	30,084	111%	108%
The total emission from all zones in the study area					

Data Sources: DMRB Screening method version 1.02 (November 2003)

Qualitative Comments: Total emissions of CO_2 are predicted to increase between the 2005 and 2010 do minimum scenarios. The operation of the proposed scheme in 2010 causes an increase in CO_2 emissions of approximately 8% on the emissions predicted for the 2010 baseline scenario, mainly due to an increase in the length of road sections that make up the total route assessed.

The results for total emissions of other pollutants can be found in Appendix 15.2.

15.9.2.2 Local Concentrations of Air Pollutants

The proposals are not expected to give rise to a significant change in the number or type of vehicles using the A90 or on the speeds of vehicles. The largest impact would therefore result from the realignment of the carriageway.

The scheme would have small positive or negative effects on properties along the route of the scheme. The impact at the majority of properties would be positive. The most significant negative change in air quality for this scheme is likely to occur between Orrock House and Kirkhill where the carriageway would be moved closer to a number of properties including Dambrae, Stoneyards Cottages and Aikenshill. There would also be improvements along this stretch of the existing A90, and at Foveran, where the carriageway would be moved away from properties such as The Cock and Bull Public House and Southlea.

15.9.2.3 Property Count

A listing of the number of properties by distance band from the A90 is given in Table 15.5. This table also shows the number of properties expected to experience an improvement or deterioration in air quality.

A constraints map showing properties that might possibly be affected by a change in air pollution is given in Figure 15.2a-e. This map shows contours at 50m, 100m, 150m and 200m from the road centreline.

A map showing those properties most likely to experience an improvement or deterioration in air quality as a result of the scheme is shown in Figure 15.3a-e.

Table 15.5: The Number of Properties by Distance Band from the Proposed Scheme

Distance Band	**Number of Properties**	
	Existing Route	**Proposed Scheme**
0-50m	56	25
50-100m	52	44
100-150m	59	61
150-200m	85	76

Distance Band	Number of Properties	
	Existing Route	Proposed Scheme
0-200m	252	206
Number of properties with an improvement in air quality	-	75
Number of properties with a deterioration in air quality	-	11

The scheme would reduce the total number of properties within 0-50m, 50-100m, 150-200m and 0-200m of the road centre line when compared to the existing route.

There is no change in the number of properties as a result of the scheme, i.e. none are demolished.

More properties would experience an improvement in air quality as a result of the scheme than would experience a deterioration.

15.9.2.4 Change in Exposure

The results of the route assessment are as follows. The PM_{10} score for the scheme is -535.98µg/m^3, and the NO_2 score is -345.75µg/m^3. These assessment scores show that the scheme represents an improvement in exposure compared to the existing route.

The scheme would not lead to an increase in annual mean PM_{10} concentrations of 1µg/m^3 or more at 20m from the road centre or an increase in NO_2 concentrations of 2µg/m^3 or more at 20m from the road centre. These are the thresholds above which the DMRB methodology requires qualitative comment to be made.

15.9.2.5 Concentrations at Representative Properties

PM_{10} and NO_2 concentrations at representative properties along the route are given in Table 15.6 below. The figures in brackets are the changes in concentrations compared to the 2010 existing route.

Table 15.6: Estimated Concentrations at Representative Properties along the Route (µg/m^3).

Property	2005		2010			
	Existing Route		Existing Route		Proposed Scheme	
	PM_{10}	NO_2	PM_{10}	NO_2	PM_{10}	NO_2
The Cock and Bull Inn	13.71	11.46	12.10	8.55	11.35 (-0.75)	5.75 (-2.80)
Dambrae	10.90	3.81	10.36	2.89	10.53 (0.16)	3.38 (0.49)
Southlea	12.21	7.73	11.21	5.84	10.42 (-0.79)	3.32 (-2.52)
Kirkhill	9.70	3.40*	9.62	2.60*	10.33 (0.70)	2.69 (0.09)
Foveran School	13.85	11.88	12.18	8.88	10.60 (-1.58)	3.72 (-5.16)
Fountainbleau	13.08	10.10	11.70	7.53	11.19 (-0.51)	5.39 (-2.14)

* - Background concentrations assumed.

The scheme would not cause an increase in PM_{10} concentrations at the receptors considered of 1µg/m^3 or more, or an increase in NO_2 concentrations of 2µg/m^3 or

more, which are the thresholds above which the DMRB methodology requires qualitative comment to be made.

The scheme would give rise to some improvements in air quality at the Cock and Bull Public House, Southlea, Foveran School and Fountainbleau. The scheme would give rise to a small deterioration in air quality at Dambrae and Kirkhill.

Figure 15.3a-e shows the location of the 75 properties likely to experience an improvement in air quality similar to that estimated in Table 15.6. Most of these properties are located along the existing route of the A90 between Balmedie and Foveran. Properties likely to experience a deterioration in air quality similar to that at Dambrae and Kirkhill include Orrock House and the Mains of Orrock Steadings, Aikenshill Cottages, Stone Yards Cottages and the Mill of Foveran.

The largest predicted increase in PM_{10} concentrations is 0.70µg/m^3 at Kirkhill. The largest predicted increase in NO_2 concentrations is 0.49µg/m^3 at Dambrae. At all of the locations considered except Kirkhill, concentrations are below those predicted for the existing alignment in 2005 and all of the concentrations are well below the statutory air quality objectives.

The changes in local air quality at the properties in the study area would be detectable using air quality monitoring techniques but would not cause a material change in the environment. The changes are below the thresholds given within DMRB which require qualitative comment. The operational effects would be minor, with beneficial effects at 75 properties, and adverse effects at 11 properties all non-significant).

15.9 SUMMARY

- Air quality within the study corridor is good. There are no Air Quality Management Areas in Aberdeenshire. Concentrations of all pollutants considered in this review were found to be well within the statutory objectives.
- The main impacts during construction would result from emissions of dust and PM10. These impacts would be minimised by implementing best management practice on site and overall the effects are considered to be minor adverse (not significant).
- The results of the local air quality assessment for the operational phase were that seventy five properties within the study corridor would experience minor beneficial effects on air quality due to the scheme and 11 would experience minor adverse effects. Concentrations at all properties would remain well within the statutory objectives.
- The main effects of the scheme on total emissions during operation is an increase of CO2 and NOx emissions associated with the scheme in 2010 largely due to an increase in the length of road sections that make up the total route assessed. Emissions of NOx are predicted to decrease with time from the 2005 baseline scenario due to general improvements in vehicle and fuel technology.
- Overall, the scheme would have positive effects on air quality for the local population.

APPENDIX 15.1

GLOSSARY

Term	Definition
AADF/T Annual Average Daily Flow/Total	A daily total traffic flow (24 hrs), expressed as a mean daily flow across all 365 days of the year.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedences within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between 2 years, which is useful for pollutants that have higher concentrations during the winter months.
AQMA	Air Quality Management Area.
Exceedence	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
HDV/HGV	Heavy Duty Vehicle/Heavy Goods Vehicle.
LAQM	Local Air Quality Management.
NO	Nitrogen monoxide, a.k.a. nitric oxide.
NO_2	Nitrogen dioxide.
NO_x	Nitrogen oxides.
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
Road link	A length of road which is considered to have the same flow of traffic along it. Usually, a link is the road from one junction to the next.
µg/m^3 microgrammes per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of 1ug/m3 means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

APPENDIX 15.2

CALCULATIONS OF TOTAL EMISSIONS OF POLLUTANTS

Results of Calculations of Total Emissions of Pollutants

Name	A90(T)
Year	2010

Pollutant	Total Emissions			Units
	Existing	With Scheme	Change	
CO	93,408	99,438	+6,030	kg/year
THC	13,682	14,511	+829	kg/year
NO_x	123,147	133,281	+10,134	kg/year
PM_{10}	4,068	4,525	+457	kg/year
CO_2	27,947	30,084	+2,137	tonnes/year

APPENDIX 15.3

METHOD OF CALCULATION

The tables below show how the assessment scores were calculated for NO_2 and PM_{10}. The numbers presented on the fourth and sixth lines of each table are scores calculated using the number of properties within each respective 50m band and the predicted NO_2/PM_{10} concentration within that band.

PM_{10}, SUMMARY:	**0-50m**	**50-100m**	**100-150m**	**150-200m**	**0-200m**
	(i)	**(ii)**	**(iii)**	**(iv)**	**(v=i+ii+iii+iv)**
Total properties across route (min)	56	52	59	85	252
Total properties across route (some)	25	44	61	76	206
***Do-minimum* PM_{10} assessment**					Total assessment PM_{10} **(I)**:
***across route* (µg/m^3)**	684.88	564.72	618.91	881.45	2749.96
***Do-something* PM_{10} assessment**					Total assessment PM_{10} **(II)**:
***across route* (µg/m^3)**	307.25	478.72	639.89	788.12	2213.98
(µg/m^3)					-535.98
Number of properties with an improvement					***75***
Number of properties with no change					***0***
Number of properties with a deterioration					***11***

Reference Sources: DMRB Screening method version 1.02 (November 2003)

Quantitative Measures: Air quality would improve (negative number)

Assessment Scores: - 535.98 µg/m3

Qualitative Comments: The scheme would give rise to an improvement in air quality as fewer properties are located within 200m of the road. The scheme is not located within an air quality management area

NO_2, SUMMARY:	**0-50m**	**50-100m**	**100-150m**	**150-200m**	**0-200m**
	(i)	**(ii)**	**(iii)**	**(iv)**	**(v=i+ii+iii+iv)**
Total properties across route (min)	56	52	59	85	252
Total properties across route (some)	25	44	61	76	206
***Do-minimum* NO_2 assessment**					Total assessment NO_2 **(I)**:
***across route* (µg/m^3)**	543.76	266.24	208.27	251.6	1269.87
***Do-something* NO_2 assessment**					Total assessment NO_2 **(II)**:
***across route* (µg/m^3)**	249.75	230.12	217.77	226.48	924.12
(µg/m^3)					-345.75
Number of properties with an improvement					***75***
Number of properties with no change					***0***
Number of properties with a deterioration					***11***

Reference Sources: DMRB Screening method version 1.02 (November 2003)

Quantitative Measures: Air quality would improve (negative number)

Assessment Scores: -345.75 µg/m3

Qualitative Comments: The scheme would give rise to an improvement in air quality as fewer properties are located within 200m of the road. The scheme is not located within an air quality management area

16 PEDESTRIANS, CYCLISTS, EQUESTRIANS AND COMMUNITY EFFECTS

16.1 INTRODUCTION

This chapter considers the proposed scheme's impacts on journeys people make in its locality. Journeys include those made by pedestrians, cyclists and equestrians and also local traffic.

The appraisal considers severance of community journeys which can be defined as a reduction in the ease or amenity of community journeys where these are made for local domestic or leisure purposes. Effects on community journeys are considered during construction of the proposals and once the scheme is operational. Specific effects on traffic disruption during construction are appraised in Chapter 13: Disruption due to Construction. Traffic flow changes resulting from the scheme are discussed in Chapter 4.

The key local community facilities have been assumed to be in Balmedie, Belhelvie, Foveran and Tipperty and the area which could be affected as the local communities and scattered properties which access the villages by the network of roads and tracks along the existing A90 corridor. Community facilities include shops, primary schools, churches, community centres, libraries, post offices, and doctor's surgeries etc (see Figure 6.1a-e). Facilities used by vulnerable and special groups within the community, such as schools or facilities for the elderly have been given special attention in the assessment.

Existing footpaths, cycle and equestrian facilities have been identified and taken into account in the assessment of effects.

16.2 SOURCES OF INFORMATION

The following sources of information have been used to inform the appraisal:

- Aberdeenshire Local Plan (ALP)215 (adopted 30th June 2006);
- feedback from consultees including Aberdeenshire Council Environment Team Response, The Forestry Commission, British Horse Society and Scotways;
- site visits in 2006 - 2007;
- 1:25,000 OS map Ellon & Inverurie (Explorer 421);
- feedback from the public exhibitions; and
- various local websites including Belhelvie Community Council (www.belhevie.org.uk) and UK villages online local village information (www.ukvillages.co.uk).

16.3 CONSULTATIONS

Key issues raised by consultees included:

- the need to improve foot access to the church at Belhelvie from Balmedie for local people;
- the need to keep as many crossing points open across the new road as present for equestrians (British Horse Society, 2006);

[215] Aberdeenshire Council (2006) Aberdeenshire Local Plan (ALP). Aberdeenshire Council

- the inclusion of overpasses and underbridges to provide for non motorised users for general access provision and in taking cognisance for the Aberdeen Core Paths216 Planning (Aberdeenshire Council, 2006).

16.4 BASELINE

16.4.1 Community Facilities

The key community facilities[217] which have been identified in the study area are:

Balmedie
- Balmedie Primary School (acting as Community Centre in the evenings)
- Balmedie Library
- Balmedie Leisure Centre
- Balmedie Post Office
- 2 Local Grocery Shops
- 'Cutting Crew' Hairdressers
- Balmedie House and Eigie Elderly Residential Care Homes
- Cock and Bull Public House and Licensed Restaurant
- White Horse Inn Hotel, Bar and Restaurant
- Hungry Dune's Fish Shop
- Balmedie Service Station (car maintenance and repairs)
- Mushroom Grower/Retailer
- Balmedie Country Park

Belhelvie
- Belhelvie Church
- Belhelvie Community Centre

Foveran
- Foveran Primary School
- Foveran Church (located near Newburgh)

Tipperty
- Tipperty Primary School

South of Balmedie there is also the East Aberdeenshire Golf Club, the Easter Hatton Landfill Site and Blackdog Rifle Ranges. Informal consultation with landowners has indicated that at Seven Acres, Hill of Menie and Boghead there are horse riding facilities. The closest doctor's surgeries and dentists are nearby in Ellon and Bridge of Don (14.2km and 8.9km from Balmedie respectively).

16.4.2 Current Community Journeys and Linkages

The road network, dominated by the existing A90, is the key communication link between local communities in the corridor (see Section 6.4.2 and Table 16.2).

[216] Aberdeen Core Paths: The Land Reform (Scotland) Act 2003 requires local authorities and national park authorities throughout Scotland to prepare Core Paths Plans 'sufficient for the purpose of giving the public reasonable access throughout their area'. Following a period of consultation Aberdeen plans to adopt its Core Paths plan in 2008. Review of progress on the website indicates that the plan is still being developed and there are as yet no firm proposals

[217] Information Sourced from: Belhevie Community Council Website: www.belhevie.org.uk and UK Villages Local Village Information Website: www.ukvillage.co.uk [Accessed 13.11.06]

Other road routes which are used by local communities to access the facilities listed in Section 16.4.1 are:

- the B977 west off the A90 to access Belhelvie Church, community centre and residential properties;
- the A975 and B9000 east of the A90 to access Newburgh;
- local distributor roads through Balmedie providing access to residential properties and various facilities including access to Balmedie Country Park; and
- various minor roads to access individual properties and community facilities.

The National Catalogue of Rights of Way shows two rights of way in the vicinity of the scheme corridor (see Section 6.4.4). Feedback from consultees and residents in the area indicates that there is informal recreation in the area (walking, cycling and horse-riding) and that existing routes are important for local communities. Existing paths, tracks and minor roads used for access are:

- a footpath from the southern entrance to Balmedie (NGR NJ 964 171) linking from Old Road through the small area of shelterbelt plantation to the housing estate to the east;
- informal recreation paths (walking, horseriding etc) based in and around Scottish Forestry Grant Scheme (SFGS) 218 area at Aikenshill (see section 6.4.4 and 6.4.5);
- roadside footways in Balmedie, Belhelvie, Foveran and Tipperty;
- footpath alongside the Foveran Burn; and
- two paths in Fornety SFGSs in the area of the scheme (see Section 6.4.4 and 6.4.5).

There are steps leading from Balmedie up to the carriageway opposite the Holdings. This is a remnant of the road that linked The Holdings to the Old Road before the existing A90 was built. Pedestrians use the route to cross the existing A90, using a gap in the central reserve, and access a track that leads up to and past No. 6 The Holdings. The B977 is used as a walking route to and from Balmedie to access facilities in the village and Belhelvie Church. In both directions walkers have to cross the busy existing A90 using the gap in the central reserve at the north end of Balmedie.

16.5 ASSESSMENT METHODOLOGY

The approach to assessment of community severance is based on guidance in Volume 11 of the DMRB, Pedestrians and Others and Community Effects[219]. The DMRB concentrates on the impact of a proposed scheme on pedestrian, cyclists, and equestrians. Emphasis is placed on the positive or negative change to journey length and amenity experienced by these groups (see Section 16.1). Changes in journey length can be caused either by the loss of a community

[218] While these cannot obstruct any public right of way over land there is no condition to provide new public access. However the owner/manager must comply with the responsibilities of a land manager in relation to responsible access secured by the Land Reform (Scotland) Act 2006. It appears from team site visits and discussions with local people that these planted areas are used for informal recreation and access

[219] Department of Transport/Scottish Office Industry Department/Welsh Office/Department of the Environment for Northern Ireland (1993) Design Manual for Roads and Bridges, Volume 11: Environmental Assessment. HMSO. Department of Transport/Scottish Office Industry Department/Welsh Office/Department of the Environment for Northern Ireland (1994) First Amendment to Design Manual Volume 11. HMSO. The technical chapters of the DMRB have subsequently been updated and amended on a number of occasions

resource (requiring the use of another somewhere else) or by the scheme acting as a barrier which deters people from using an existing facility.

The approach to assessment of the effects of the scheme on pedestrians, cyclists, equestrians and community effects was carried out in the following stages:

- first, as DMRB requires, existing local travel patterns were established through identification of community facilities in the study area and estimating the likely patterns of usage of these facilities;
- the roads and routes affected by the proposals were then considered, including all roads and tracks which are physically crossed by the scheme and those which are predicted to be subject to significant traffic flow changes (increases and decreases);
- the effects of the scheme on the community journeys identified was then predicted and evaluated using the criteria described below (see Table 16.1).

In presenting and discussing the approach to the assessment of community severance effects, it should be noted that significant effects on community journeys as a result of changes to access routes, diversions of pedestrian, cyclist or equestrian journey routes were scoped out of the assessment at an early stage. This is because the scheme is not predicted to physically change most community journeys made in the study corridor. The approach to the assessment, and the level of detail on existing (baseline) community journeys reflects this scoped assessment.

16.5.1 Evaluation Criteria

The evaluation is based on judgement taking into account the following factors:

- the type of route involved;
- the nature and degree of effect on the length, complexity and amenity of the journey;
- the purpose of the journey in relation to the type of effect (leisure journeys might be more affected by amenity and essential journeys e.g. to school, by length and difficulty);
- whether the journey is made by particularly vulnerable or special groups.

The assessment does not consider specifically the number of people whose journey would be affected but has concentrated on an appraisal of which journeys could be affected to the various community facilities. User counts were not considered necessary since baseline provision of paths etc is low and consultations and feedback from the local community indicated that severance by the existing A90 is significant because of the volume of traffic on the road. It was considered likely that the new provision provided opportunities to reduce current severance provided that suitable access was provided over the new road.

The impact on journeys was assessed using the criteria set out in Table 16.1.

Table 16.1: Evaluation Criteria used for Assessing Pedestrians, Cyclists, Equestrians and Community Effects

Effect	Definition
Minor	• in general the current journey pattern is likely to be maintained but there would be some hindrance to movement and/or a small reduction in amenity
Moderate	• some residents, particularly children and elderly people, are likely to be dissuaded from making the journey, or the journey would be made moderately longer and/or less pleasant
Major	• many people are likely to be deterred from making the journey to an extent sufficient to induce a re-organisation of their habitats, or the journey would be made substantially longer and/or less pleasant

DMRB offers some guidance on judging the effect of changes in the length of non-car journeys[220]:

- an increase in pedestrian journey length will be moderate if it is lengthened by 0.25-0.5km and substantial if it is lengthened by >0.5km;
- an increase in cyclist journey length will be moderate if it is lengthened by 1-2km and substantial if it is lengthened by >2km[221] .

Horse riders are not considered to be affected by length as their journeys are usually for leisure purposes.

Information in DMRB also suggests that effects on pedestrians crossing roads affected by changes in traffic flows should be evaluated as follows[222] :

- if the flow increases or decreases[223] by 30%, the impact is slight;
- from 30% to 60% the impact is moderate;
- if more than 60%, the impact is substantial.

These effects considered include positive changes (e.g. from a reduction in traffic flows on local roads within the study corridor) as well as negative. The assessment of community severance has addressed the scheme as a whole and therefore takes into account all the impacts arising from its component parts and the interactions between them.

16.6 POTENTIAL IMPACTS

16.6.1 Permanent

Potential permanent impacts include:

[220] Length is only considered to impact non-car journeys to and from facilities and not those taken for leisure purposes along footpaths, cycle routes and bridleways. All equestrian journeys are assumed to be for leisure purposes

[221] DMRB guidance suggests pro rata speeds of 5km/h for pedestrians and 20km/h for cyclists

[222] DMRB provides additional criteria for evaluation of new severance where new pedestrian at-grade crossings of roads are required

[223] DMRB defines thresholds for severance according to relief of traffic. In the absence of other guidance we have taken a 30% threshold as the starting point for the assessment of both increased severance and relief from severance

- removal of footpaths and current accesses (e.g. the steps leading from Balmedie to the A90 opposite the Holdings);
- permanent changes in journey length or ease of journeys for pedestrians, cyclists and equestrians through the changes in infrastructure (for example, path diversions, stopping up tracks etc); and
- permanent changes in the ease of making journeys through increases in traffic on existing roads.

16.6.2 Construction

Potential construction impacts include:

- temporary changes in journey length or ease of making journeys for pedestrians, cyclists and equestrians through construction activities.

16.6.3 Operational

Potential operational impacts include:

- safer and more enjoyable cycling on existing roads due to reductions in the volume of traffic;
- safer access for equestrians to the coast;
- disruption to pedestrian activity from increased traffic on some side roads; and
- increased travelling time for residents of the scattered settlements to travel to local amenities.

16.7 MITIGATION MEASURES

PLE1. Grade separated access routes across the new A90(T) would be provided for vehicles and non-vehicle users including footways at Balmedie.

PLE2. A farm access would be provided at Aikenshill to allow movement of stock and farm vehicles between fields.

PLE3. Alternative routes would be signed for any access route temporarily affected during construction.

PLE4. The visual barrier of the new road would be mitigated, in part, by careful design and new planting.

PLE5. The contract documents would specify construction traffic routes which use the existing A90 and road network as far as possible.

PLE6. Construction traffic would only access and egress the construction working areas using the strategic road network unless local trips or importing from local sources (e.g. quarries etc).

PLE7. A new shared pedestrian/cycle path to Belhelvie Church from Balmedie via the Keir Farm underpass would be provided.

PLE8. All side road bridges would have footway provision.

PLE9. Access to all properties would be maintained throughout construction.

16.8 ASSESSMENT OF RESIDUAL EFFECTS

16.8.1 Permanent

Permanent effects of the proposed scheme include direct physical severance effects on community journeys made by vehicle (see Table 16.2). There would be a significant reduction in traffic on the existing A90 which would mean that

users would benefit from a more accessible, safer and user friendly local road for motorised and non motorised users.

There would be a permanent increase in vehicle journey length for access to Balmedie and Tipperty for some properties including The Holdings, Belhelvie Church, Belhelvie Community Centre, residential properties in Belhelvie, Drumhead Cottage, Drumhead Lodge and Fornety. All these properties would experience a moderate adverse effect on access (see Table 16.1).

Pedestrians would experience a major permanent increase (more than 0.5km) in journey length when accessing Balmedie and Tipperty from The Holdings, Belhelvie Church, Belhelvie Community Centre, residential properties in Belhelvie, Drumhead Cottage, Drumhead Lodge, Kirkhill, Easter Hatton and Fornety. All other properties would experience a moderate increase (0.25km to 0.5km) or no significant effect (see Section 16.5.1).

Cyclists from Drumhead Lodge and Fornety accessing Balmedie and Tipperty would experience a substantial increase (major effect) (increase of 2km and above) in journey length and Drumhead Cottage would experience a moderate increase (increase of 1km to 2km) in journey length. All other properties access by bicycle to Balmedie and Tipperty experience no significant effect (see Section 16.5.1).

The upgrade of some currently unsurfaced roads (e.g. access road to South Orrock and Mains of Orrock) would slightly improve access to community facilities. Overbridges and underpasses would provide permanent and safe access across the A90(T) for cars, pedestrians, cyclists and equestrians.

Existing footpaths and pedestrian routes in the corridor would be mostly retained and new paths would be provided. The rights of way in the woodland at Fornety would not be directly affected by the scheme. The path through to houses from Old Road, which might be affected by some construction works to improve visibility on the road, would be made good and retained. A new 3m wide cycleway/footway would be provided from Balmedie, via the existing Keir underpass, to Drumhead and Belhelvie Church which would provide a safer and easier access route between the two communities (see Figure 6.1b).

The steps from Balmedie leading up to the A90, opposite the Holdings would be closed up. This would increase the journey times for pedestrians from Balmedie crossing the A90 who would be required to use an alternative footway which would be provided from the road out of The Holdings on to the new B977. The route would be longer (approximately 1.2km more than using the steps) but would be safer. A new footway would also be provided beside the Millden Link Road from the golf course. The new footways (the one from The Holdings and the one from the golfcourse) would join and run through the Balmedie underpass on one side of the road and link into Balmedie.

Table 16.2: Access to Local Amenities in Balmedie and Tipperty

Property	Existing Access (A90)	Access with Proposed Road (A90(T))	Comments	Effect (see criteria in Table 16.1)
West A90(T)				
Wester Hatton	Direct access from the timber yard from the west side of the road	Direct access from the timber yard from the west side of the road	*Balmedie and Tipperty:* No change	No effect
Millden and East Aberdeenshire Golf Club	Very short distance travelled south on minor access road. Access to the A90 from the west side of the road	Short distance travelling north along the Millden link road and access on to the A90(T) via the Balmedie Junction roundabout	*Balmedie and Tipperty:* No effect.	No effect
South Folds	Direct access from property driveways onto A90 from the west side of the road	Access onto Balmedie Junction roundabout from west side to access A90(T)	*Balmedie and Tipperty:* Little change in distance travelled	Minor
The Holdings	Very short distance travelling on unsurfaced road to access A90 from the west side of the road (approximately 0.01km)	Diversion west to meet B977 Realignment and onto Balmedie Junction roundabout to gain access to A90(T) (approximately to 0.7km)	*Balmedie:* Moderate change to distance travelled (increase of approximately 0.7km) and longer journey time *Tipperty:* Minor change to distance travelled and journey time	**Moderate**
Keir Farm	Short distance travelling east on minor road and through an underpass into Balmedie where access can be gained to A90 from the east side of the road	Short distance travelling east on minor road and through an underpass into Balmedie where access can be gained to A90	*Balmedie and Tipperty:* No change	No Effect
Belhelvie Church, Community Centre and Houses	Medium length distance travelling east (approximately 1km) on minor road with access onto A90 from the west side of the road	Short distance travelling south east on the B977 Realignment travelling to Balmedie Junction roundabout to gain access to A90(T) (approximately 2.3km)	*Balmedie:* Moderate change to distance travelled (increase of approximately 1.3km) and longer journey time *Tipperty:* Significant increased journey time and distance travelled	**Moderate**
Drumhead Cottage	Short distance travelling east (approximately 0.4km) on minor road with access onto A90 from the west side of the road	Short distance travelling west to join B977 Realignment travelling south east to Balmedie Junction roundabout to gain access to A90(T) (approximately 1.9km)	*Balmedie:* Moderate change to distance travelled (increase of approximately 1.5km) and longer journey time *Tipperty:* Significant increased journey time and	**Moderate**

Property	Existing Access (A90)	Access with Proposed Road (A90(T))	Comments	Effect (see criteria in Table 16.1)
			distance travelled	
Drumhead Lodge	Short distance travelling east (approximately 0.2km) on minor road with access onto A90 from the west side of the road	Short distance travelling west to join B977 Realignment travelling south east to Balmedie Junction roundabout to gain access to A90(T) (approximately 2.2km)	*Balmedie:* Moderate change to distance travelled (Increase of approximately 2km) and longer journey time *Tipperty:* Significant increased journey time and distance travelled	**Moderate**
South Orrock	Short distance travelling east on unsurfaced road with access onto A90 from the west side of the road	Short distance travelling east on new minor road/underpass under A90(T) with direct access onto A90 from the underpass	*Balmedie and Tipperty:* No change	Minor
Orrock House	Short distance travelling east (approximately 0.6km) on minor road with access onto A90 from the west side of the road	Short distance travelling north east on minor road then east joining new underpass under A90(T) with direct access onto A90 from the underpass (approximately 0.9km)	*Balmedie and Tipperty*: Minor change to distance travelled (increase of approximately 0.3km)	Minor
Damhead	Short distance travelling east (approximately 1.15km) on minor road with access onto A90 from the west side of the road	Short distance travelling east on minor road joining new underpass under A90(T) with direct access onto A90 from the underpass (approximately 1.25km)	*Balmedie and Tipperty*: Minor change to distance travelled (increase of approximately 0.1km) and longer journey time	Minor
North Orrock	Short distance travelling southeast on minor road with access onto A90 from the west side of the road	Short distance travelling eastwards on minor road meeting new underpass under A90(T) with direct access onto A90 from the underpass	*Balmedie and Tipperty*: Slightly more direct journey but little change to journey length or distance	Minor
Boghead	Very short distance travelling southeast on unsurfaced road, short distance travelling southeast on minor road with access onto A90 from the west side of the road	Very short distance travelling southeast on unsurfaced road, short distance travelling eastwards on minor road meeting new underpass under A90(T) with direct access onto A90 from the underpass	*Balmedie and Tipperty*: Slightly more direct journey but little change to journey length or distance	Minor
Hill of Menie Croft	Short distance travelling east on unsurfaced track/road with access onto A90 from the west side of the road	Short distance travelling east on unsurfaced track/road, short distance travelling north on new minor road meeting new underpass at Dambrae under A90(T) with direct access onto A90 from the underpass	*Balmedie and Tipperty*: Slightly longer distance travelled, however journey time unlikely to change as roads travelled on are better	Minor

Property	Existing Access (A90)	Access with Proposed Road (A90(T))	Comments	Effect (see criteria in Table 16.1)
			quality	
Wardhead/Seven Acres	Short distance travelling east on minor road with access onto A90 from the west side of the road	Short distance travelling east on minor road meeting new underpass at Dambrae under A90(T) with direct access onto A90 from the underpass	*Balmedie and Tipperty*: Little change to distance or time travelled.	No Effect
Stoneyards	Short distance travelling east on unsurfaced road with access onto A90 from the west side of the road	Short distance travelling west on unsurfaced then surfaced minor road to join minor road travelling east and meeting new underpass at Dambrae under A90(T) with direct access onto A90 from the underpass	*Balmedie and Tipperty*: Increase in journey time and distance travelled	Minor
Kirkhill	Short distance travelling east on minor road with access onto A90 from the west side of the road (approximately 1km)	Short distance travelling east meeting new minor road running parallel with A90(T) before travelling northwest on existing minor road then meeting Newburgh Road Junction with access to A90 travelling south to Balmedie and access to A90(T) then A90 travelling north (approximately 1.6km)	*Balmedie and Tipperty*: Minor change to journey time and distance travelled (increase of approximately 0.6km)	Minor
Overhill	Short distance travelling northeast through Foveran on minor road OR short distance travelling south east past Rashiereive, both with access onto A90 from the west side of the road (approximately 0.9km)	Short distance travelling south on minor road meeting Newburgh Road Junction with access to A90 travelling south to Balmedie and access to A90(T) then A90 travelling north OR short distance travelling northeast through Foveran on minor road with direct access onto A90 from the west side of the road (approximately 1km)	*Balmedie and Tipperty*: Little change to journey time and distance travelled (increase of approximately 0.1km)	Minor
Blairythan Smithy	Direct access onto A90 from the west side of the road	Direct access onto A90 from the west side of the road with some travel on the A90(T) to access Balmedie and Tipperty	*Balmedie and Tipperty*: Little change to journey distance but travel on A90(t) required for sections of the journey. Journey time likely to be reduced	Minor
Ardgill	Short distance travelling east on minor road through Foveran with access onto A90 from the west side of the road	Short distance travelling east on minor road through Foveran with direct access onto A90 from the west side of the road with some travel	*Balmedie and Tipperty*: Little change to journey distance but travel on A90(t) required	Minor

Property	Existing Access (A90)	Access with Proposed Road (A90(T))	Comments	Effect (see criteria in Table 16.1)
		on the A90(T) to access Balmedie and Tipperty	for sections of the journey. Journey time likely to be reduced	
Foveran	Direct access onto A90 from the west side of the road	Direct access onto A90 from the west side of the road with some travel on the A90(T) to access Balmedie and Tipperty	*Balmedie and Tipperty*: Little change to journey distance but travel on A90(T) required for sections of the journey. Journey time likely to be reduced	Minor
Oldmill Croft, Duncan Oldyard, Ammonlea and Barndeen	Direct access on to the A90 from the east	Direct access on to the A90 from the east.	*Balmedie and Tipperty:* No change	No effect
Latchcroft	Short distance travelling east on minor road with access onto A90 from the west side of the road	Short distance travelling east on minor road with direct access onto A90 from the west side of the road with some travel on the A90(T) to access Balmedie and Tipperty	*Balmedie and Tipperty*: Little change to journey distance but travel on A90(T) required for sections of the journey. Journey time likely to be reduced	Minor
Kincraig	Short distance travelling east on minor road with access onto A90 from the west side of the road	Short distance travelling east on minor road with direct access onto A90 from the west side of the road with some travel on the A90(T) to access Balmedie and Tipperty	*Balmedie and Tipperty*: Little change to journey distance but travel on A90(T) required for sections of the journey. Journey time likely to be reduced	Minor
West Pitmillan	Short distance travelling southeast on minor road with access onto A90 from the west side of the road	Short distance travelling southeast on minor road with direct access onto A90 from the west side of the road with some travel on the A90(T) to access Balmedie and Tipperty	*Balmedie and Tipperty*: Little change to journey distance but travel on A90(t) required for sections of the journey. Journey time likely to be reduced	Minor
Fountainbleau	Direct access onto A90 from the west side of the road	Direct access onto new minor side road at Tipperty Junction to travel south to Balmedie and direct access onto minor road (some new,	*Balmedie and Tipperty*: Little change to journey distance but travel on A90(T) required	Minor

Property	Existing Access (A90)	Access with Proposed Road (A90(T))	Comments	Effect (see criteria in Table 16.1)
		some existing: B9000) travelling short distance northeast via South Farden to Tipperty	for sections of the journey. Journey time to Balmedie is likely to be reduced	
South Farden	Short distance travelling southeast on B9000 with access onto A90 from the west side of the road OR slightly longer distance travelling north east through Tipperty	Short distance travelling south on B9000 extension to meet Tipperty junction to travel south to Balmedie OR short distance travelling northeast on minor road (some new, some existing: B9000) to Tipperty	*Balmedie*: Little change to journey distance but likely reduced journey time *Tipperty*: Slightly reduced journey distance and time	Minor
East A90(T))				
Blackdog Rifle Ranges	Short distance travelling west on access road with access on to the A90 from the east	Short distance travelling west on access road with access on to the A90(T) from the east	*Balmedie and Tipperty:* No change	No effect
Easter Hatton Landfill Site and properties	Direct access on to the A90 from the east side of the road	Short distance travelling south on the Easter Hatton link road with access to the A90(T) from the east	*Balmedie and Tipperty:* Minor change in journey distance (increase of approximately 0.6km) and distance	Minor
Jaswood	Short distance travelled along minor road with access onto A90 from the east side of the road	Short distance travelled along minor road with direct access onto A90 from the east side for travel south to Balmedie, short distance travelled along minor road with direct access onto A90 from the east side joining Newburgh Road Junction for travel north on A90(T) and A90 to Tipperty	*Balmedie and Tipperty*: Little change in journey time and distance	Minor
The Bungalow	Short distance travelled along minor road with access onto A90 from the east side of the road	Direct access onto A90 from the east side for travel south to Balmedie, direct access onto A90 from the east side joining Newburgh Road Junction for travel north on A90(T) and A90 to Tipperty	*Balmedie and Tipperty*: Little change in journey time and distance	Minor
Blairton	Short distance travelled along minor road with access onto A90 from the east side of the road	Short distance travelled along minor road with direct access onto A90 from the east side for travel south to Balmedie, short distance travelled along minor road with direct access onto A90 from the east side joining Newburgh Road Junction for travel north on A90(T) and A90 to Tipperty	*Balmedie and Tipperty*: Little change in journey time and distance	Minor

Property	Existing Access (A90)	Access with Proposed Road (A90(T))	Comments	Effect (see criteria in Table 16.1)
Sidney Cottage	Direct access onto A90 from the east side of the road	Direct access onto A90 from the east side for travel south to Balmedie, direct access onto A90 from the east side joining Newburgh Road Junction for travel north on A90(T) and A90 to Tipperty	*Balmedie and Tipperty*: Little change in journey time and distance.	Minor
Cock and Bull Public House	Direct access onto A90 from the west side of the road	Direct access onto A90 from the west side for travel south to Balmedie, direct access onto A90 from the west side joining Newburgh Road Junction for travel north on A90(T) and A90 to Tipperty	*Balmedie and Tipperty*: Little change in journey time and distance	Minor
Seaview	Direct access onto A90 from the east side of the road	Direct access onto A90 from the east side for travel south to Balmedie, direct access onto A90 from the east side joining Newburgh Road Junction for travel north on A90(T) and A90 to Tipperty	*Balmedie and Tipperty*: Little change in journey time and distance	Minor
Pettens	Short distance travelled along minor road with access onto A90 from the east side of the road	Short distance travelled along minor road with direct access onto A90 from the east side for travel south to Balmedie, short distance travelled along minor road with direct access onto A90 from the east side joining Newburgh Road Junction for travel north on A90(T) and A90 to Tipperty	*Balmedie and Tipperty*: Little change in journey time and distance	Minor
Hill of Menie	Direct access onto A90 from the west side of the road	Direct access onto A90 from the west side for travel south to Balmedie, direct access onto A90 from the west side joining Newburgh Road Junction for travel north on A90(T) and A90 to Tipperty	*Balmedie and Tipperty*: Little change in journey time and distance	Minor
West Lodge Menie	Very short distance travelled along minor road with access onto A90 from the east side of the road	Very short distance travelled along minor road with direct access onto A90 from the east side for travel south to Balmedie, very short distance travelled along minor road with direct access onto A90 from the east side joining Newburgh Road Junction for travel north on A90(T) and A90 to Tipperty	*Balmedie and Tipperty*: Little change in journey time and distance	Minor

Property	Existing Access (A90)	Access with Proposed Road (A90(T))	Comments	Effect (see criteria in Table 16.1)
Summerlee	Very short distance travelled along minor road with access onto A90 from the east side of the road	Very short distance travelled along minor road with direct access onto A90 from the east side for travel south to Balmedie, very short distance travelled along minor road with direct access onto A90 from the east side joining Newburgh Road Junction for travel north on A90(T) and A90 to Tipperty	*Balmedie and Tipperty*: Little change in journey time and distance	Minor
Cothill	Short distance travelled along minor road with access onto A90 from the east side of the road	Short distance travelled along minor road with direct access onto A90 from the east side for travel south to Balmedie, short distance travelled along minor road with direct access onto A90 from the east side joining Newburgh Road Junction for travel north on A90(T) and A90 to Tipperty	*Balmedie and Tipperty*: Little change in journey time and distance	Minor
Delfrigs	Direct access onto A90 from the east side of the road	Direct access onto A90 from the east side for travel south to Balmedie, direct access onto A90 from the east side joining Newburgh Road Junction for travel north on A90(T) and A90 to Tipperty	*Balmedie and Tipperty*: Little change in journey time and distance	Minor
Bog Roy	Direct access onto A90 from the west side of the road	Direct access onto A90 from the west side for travel south to Balmedie, direct access onto A90 from the west side joining Newburgh Road Junction for travel north on A90(T) and A90 to Tipperty	*Balmedie and Tipperty*: Little change in journey time and distance	Minor
Rashiereive	Direct access onto A90 from the west side of the road	Direct access onto A90 south to Balmedie and access onto Newburgh road Junction onto A90(T) and A90 north to Tipperty	*Balmedie and Tipperty*: Little change in journey time and distance	Minor
Aikenshill	Short distance travelled along minor road with access onto A90 from the west side of the road	Short distance travelled along minor road with direct access onto A90 from the west side for travel south to Balmedie, short distance travelled along minor road with direct access onto A90 from the west side joining Newburgh Road Junction for travel north on A90(T) and A90 to Tipperty	*Balmedie and Tipperty*: Little change in journey time and distance For very large farm vehicles there would be an increased journey time.	Minor

Property	Existing Access (A90)	Access with Proposed Road (A90(T))	Comments	Effect (see criteria in Table 16.1)
		Aikenshill farm would be severed by the A90(T). A farm access underbridge has been put in which would allow access for movement of stock and farm vehicles (except very large vehicles e.g. combine harvesters)		
Dykenook, Newtyle Stables, Newtyle House, Newtyle Paddock	Direct access onto A90 from the east side of the road	Direct access onto A90 from the east side for travel south to Balmedie, direct access onto A90 from the east side joining Newburgh Road Junction for travel north on A90(T) and A90 to Tipperty	*Balmedie and Tipperty*: Little change in journey time and distance	Minor
Mains of Newtyle	Short distance travelled along minor road with access onto A90 from the east side of the road	Short distance travelled on minor road with direct access onto A90 from the east side for travel south to Balmedie, short distance travelled on minor road with direct access onto A90 from the east side joining Newburgh Road Junction for travel north on A90(T) and A90 to Tipperty	*Balmedie and Tipperty*: Little change in journey time and distance	Minor
Southlea	Very short distance west on A975 Newburgh Road with access onto A90 from the east side of the road	Very short distance west on A975 Newburgh Road with direct access onto A90 south to Balmedie and access north to Tipperty via Newburgh Road Junction	*Balmedie and Tipperty*: Little change in journey time and distance.	Minor
Pitgersie	Short distance travelling south on track, on minor road west to A975 Newburgh Road with access onto A90 from the east side of the road	Short distance travelling south on track, on minor road west to A975 Newburgh Road, joining Newburgh Road Junction with access A90 from the east side of the road	*Balmedie and Tipperty*: Little change to journey time and distance	Minor
Mill of Foveran	Short distance travelling west on minor road with access onto A90 from the east side of the road	Short distance travelling west on minor road meeting overbridge with direct access onto A90 from the overbridge with some travel on A90(T) to access Balmedie	*Tipperty*: Little change to journey distance but travel on A90(T) required for sections of the journey *Balmedie*: Journey time likely to be reduced	Minor
Pitmillan	Short distance travelling southwest on track/minor road with access onto A90 from	Short distance travelled west on new overbridge over A90(T) with direct access onto	*Balmedie and Tipperty*: No change to journey time and	No effect

Property	Existing Access (A90)	Access with Proposed Road (A90(T))	Comments	Effect (see criteria in Table 16.1)
	the east side of the road	A90 from east side of road	distance	
Fornety	Short distance travelling south on minor road with access onto A90 from the east side of the road (approximately 0.6km)	Short distance travelling south on new minor road to meet Tipperty Junction for access to travel south to Balmedie on A90 with some travel on A90(T) and access to Tipperty on B9000 north (approximately 2.6km)	*Tipperty*: Moderate increase to journey time and distance (increase of approximately 2km) *Balmedie*: journey time and distance much the same	**Moderate**

16.8.2 Construction

Construction activities might cause some effects on local journeys. Access to all properties would be maintained and all pedestrian routes would remain open or a suitable alternative provided. However temporary diversions (see Section 13.9.1 and Figure 13.1) could result in some moderate adverse effects for some local residents who would be required to use diversionary routes to access local facilities. The level of impact would depend on how the contractor plans the works and for how long diversions were in place. The contractor would be encouraged to minimise all community disruption to the minimum necessary for safe construction of the works and also to keep local communities informed about disruptions and the alternative routes to be used.

16.8.3 Operational

The reduced traffic on the existing A90 once the new dual carriageway was operational would improve access to local amenities for residents near the scheme as a result of reduced congestion on the road and thus making journeys easier for all modes. The existing A90 would become safer for use by cyclists, pedestrians and equestrians as the levels of traffic would decrease significantly (see Section 4.4). Safe access to the coast would also become more possible for non motorised users as safe access across the A90(T) would be provided via underbridges and overbridges and the existing A90 would be quiet in comparison to current conditions which deter access across it (see Section 6.3).

In particular, safety for pedestrians crossing the A90(T) at Balmedie would be improved by the provision of new footways (see Section 16.8.1) as they would avoid crossing a busy, fast moving dual carriageway. The construction of the Millden Link Road would increase traffic passing between the East Aberdeenshire Golf Club clubhouse and the greens, which could potentially impact on users crossing between the two facilities. However the volume of traffic accessing the golfclub and Millden would be low (usually less than 100 vehicles a day[224]) so this is not considered to be significant.

16.9 SUMMARY

Key findings of the assessment of effects on journeys made by pedestrians, cyclists, equestrians and local traffic resulting from the scheme are:

- Access for all properties near the scheme and users of local roads to community facilities would be maintained for all modes during construction and operation of the scheme.
- Two new footways would be provided which would improve safety for pedestrians travelling to Balmedie from the west side of the A90:
    - from the link from The Holdings on to the B977 link and through the underpass to Balmedie; and
    - beside the Millden Link Road from the golf course to the roundabout and then to join with the path from The Holdings into Balmedie.
- The current crossing to The Holdings from Balmedie would be closed up. A safer alternative would be provided by the new footway from The Holdings.
- A small number of properties would experience effects to their access to community facilities in Balmedie and Tipperty as a result of the scheme.

[224] 2005 count

These effects would include a longer journey distance and time taken to access community facilities.

- There would be moderate adverse effects on vehicle journey lengths from The Holdings, Belhelvie Church, Belhelvie Community Centre, residential properties in Belhelvie, Drumhead Cottage, Drumhead Lodge and Fornety to access Balmedie and Tipperty.
- For pedestrians there would be major permanent adverse effects on journey length from The Holdings, Belhelvie Church, Belhelvie Community Centre, residential properties in Belhelvie, Drumhead Cottage, Drumhead Lodge, Kirkhill, Easter Hatton and Fornety to access Balmedie and Tipperty.
- For cyclists there would be a major permanent effects on journey length from Drumhead Lodge and Fornety to access Balmedie and Tipperty.
- During scheme construction there might be some significant adverse effects on access for local communities because of the need to use diversionary routes. These would be temporary.
- Once the new road was operational there would be significant community benefits from the reduction in traffic on the existing A90 allowing easier and safer local journeys by all modes.

17 VEHICLE TRAVELLERS

17.1 INTRODUCTION

This chapter assesses the impact of the scheme on vehicle travellers which is defined in DMRB (Volume 11: Part 9 Vehicle Travellers) as view from the road and driver stress. DMRB describes the assessment of vehicle traveller impacts as those not included in the cost-benefit quantifiable economic effects.

A new road may allow people to see landscapes not easily visible at present and this can be positive or negative depending on the character of an area. The appraisal considers the extent to which travellers, including drivers, are exposed to different types and quality of landscape from the new road. Views from the road may also benefit drivers and help reduce stress but these benefits must be balanced with the need to integrate the new road in its landscape and to reduce its visual intrusion.

17.2 SOURCES OF INFORMATION

The appraisals have been informed by the following sources of information:

- site visits in 2006-2007;
- OS Explorer map 421 Ellon & Inverurie;
- iterative design of the preferred scheme;
- traffic data and other road network information provided by CBG; and
- the landscape and visual appraisals of the scheme (see Chapter 11).

17.3 CONSULTATIONS

Discussions with local people who live in the area and use the A90 suggested that there are frustrations in busy periods and difficulties in particular relating to overtaking slow moving vehicles (e.g. farm traffic) and also when seeking to right turn onto or across the A90.

17.4 BASELINE

17.4.1 View from the Road

The character of the landscape in the road corridor varies from south to north but can generally be described as rural (see Section 11.4). At the southern end of the scheme the land sweeps down to the sea on the east and rises up to the hamlet of Millden and the golf course (see Section 6.4). From Balmedie to Delfrigs, the surrounding landscape is characterised by small fields and frequent scattered properties. On the west side of the existing A90 there are small drumlins and a few scattered copses. The east side of the road is more open giving views down to the coast until reaching Hill of Menie, where planting at the Menie Estate and Dambrae blocks clear views.

Past Delfrigs the countryside becomes more open on both sides of the road with large agricultural fields and few trees until reaching the Christmas tree plantations at Fornety, however these trees are relatively young and it is anticipated that they will be harvested while small, so they are unlikely in the future to block views from the road. Features of particular landscape interest along the route include Orrock

House, an 18th Century three gabled mansion house, and Belhelvie Ruined Church.

The description of views from the existing A90 is summarised in Table 17.1 described in three route sections.

Table 17.1: Baseline Landscape Characteristics

Route Section	Landscape Description
Balmedie to Delfrigs	The area is characterised on the west by drumlins and occasional copses. Fields are small and are often bounded by stone walls although in many places these are now decrepit. There are scattered properties, some surrounded by farm buildings and some with small copses. On the east, emerging from Balmedie there is a wooded area at Blairton but once past this the landscape is more open giving views to the coast until reaching Hill of Menie where established woodlands block views to the coast and to Menie House. South of Balmedie there are views to the Easter Hatton landfill site
Delfrigs to Rashierieve	On the west side of the existing A90, younger planting partially blocks views until shortly after Delfrigs where the landscape opens on both sides of the road. Here the fields become larger with open views to the coast
Rashierieve to Tipperty	After Rashierieve the land dips down to the flood valley at Foveran Burn with views to the sea. The road passes Foveran, a small hamlet with a primary school on the road edge. At Foveran the landscape becomes flatter and more open. There are few trees until Fornety, where there is a Christmas tree plantation however the trees do not block travellers views. The road then sweeps round to the east, and begins to rise towards Tipperty. Views to the coast remain open

17.4.2 Driver Stress

Driver stress is defined in DMRB as the 'adverse mental and physiological effects experienced by a driver traversing the network'. Road layouts, junction frequency, flow per lane and speeds will all affect a driver.

Stress may manifest itself in a variety of ways according to the individual, but is likely to induce feelings of discomfort, annoyance or fear culminating in physical and emotional tension that detract from both road safety and enjoyment of the journey experienced by the driver and passengers. Driver stress has three principal components as follows, of which one or more may manifest itself at any one time.

- One component of driver stress is that related to **uncertainty** about the route being followed. Route uncertainty is caused primarily by signing that is inadequate for the individual's purposes. Junction frequency, road layout and effectives of signing also affect the driver's ability to successfully find their route.
- A second is **frustration** and this is largely dependent on speed and flow per lane. Driver stress is caused by a driver's inability to drive at a speed consistent with his/her wishes given their perception of the general standard of the road[225]. Frustration increases as speed falls in relation to expectations and may be due to high flow levels, junctions and roadworks or to difficulties in overtaking slower moving traffic.

[225] Prevailing conditions will include the amount of traffic on the road, weather and daylight conditions. Additionally, each road has a design speed which is determined by factors such as visibility, curvature, width, surface conditions, the presence of junctions and accesses and speed limits

- The **fear** of potential accidents on a journey is the third component of driver stress. Fear is influenced by the presence of other vehicles, inadequate sight distances and the likelihood of pedestrians stepping onto the road. Other factors include inadequate lighting, narrow roads, roadworks and poorly maintained road surfaces. Fear is highest when speeds, flows and the proportion of HGVs are all high and adverse weather conditions exacerbate these factors. Road safety fears are reduced by setting high design standards[226].

17.5 ASSESSMENT METHODOLOGY

The approach taken for assessing the impact of the scheme on vehicle travellers follows the guidance detailed in DMRB, Volume 11 Environmental Assessment, Part 12: Vehicle Travellers.

17.5.1 View from the Road

17.5.1.1 Methods of Prediction

The assessment has considered the quality of the view afforded for travellers from which is determined by:

- the degree of view afforded from the road;
- the quality of the view.

The degree of view has been appraised qualitatively by review of the scheme proposals and considering the road profile (whether it is in cutting, at grade or on embankment), the neighbouring topography and the presence of barriers including noise barriers, trees and buildings etc. These features may in their turn contribute to the quality or otherwise of the view from the road.

17.5.1.2 Evaluation Criteria

DMRB identifies four levels of *degree of view*:

- **No view**: road in deep cutting or contained by earth bunds, environmental barriers or adjacent structures.
- **Restricted view**: frequent cuttings or structures blocking the view.
- **Intermittent view**: road generally at ground level but with shallow cuttings or barriers at intervals.
- **Open view**: view extending over many miles, or only restricted by existing landscape features.

The *quality of the view* would be determined by the quality of the landscape or the built environment through which the new road passes. It may benefit the view if attractive or distinctive features can be clearly seen, or the reverse if unsightly areas are visible. Scheme landscaping can contribute to short views and mitigate the loss of view when a road is, for example, in cutting. The appraisal of quality of landscape has been informed by the landscape appraisal reported in Chapter 11.

[226] Design standards cover geometric aspects of road design such as curvature, gradient and sight distances as well as distance between junctions and provision for pedestrians

A three-point scale of assessment of the view from the road for the proposed links (good, moderate, poor) has been used for the appraisal[227] for each route section as follows:

- **Good:** vehicle travellers' views are persistent (unobstructed) and extensive, providing a positive experience for travellers;
- **Moderate**: views are intermittent but generally enhance the travellers experience; and
- **Poor:** views are often obstructed and/or of poor quality, detracting from the travellers' experience.

17.5.2 Driver Stress

DMRB advocates the use of a three-point descriptive scale for representing driver stress which is based upon traffic speeds and flows in moving traffic[228]. The scale does not specifically address stress caused by queues.

17.5.2.1 Methods of Prediction

An appraisal has been undertaken of the effects on drivers of travelling on the new A90(T) as compared with current conditions on the A90 in the year of opening (2010) and 15 years after opening (i.e. 2025). The criteria set out in Section 17.5.2.2 have been used to assess the significance of effects.

17.5.2.2 Evaluation Criteria

Table 17.2 below outlines the conditions under which low, moderate and high stress levels are encountered for, dual-carriageways and single carriageway roads as set out in DMRB.

Table 17.2: Evaluation of Driver Stress

DUAL-CARRIAGEWAY ROADS			
Average Peak Hourly Flow per Lane (in flow units/hour[229])	**Average Journey Speed km/hr (mph)**		
	Under 60 (37)	**60 – 80 (37-50)**	**Over 80 (50)**
Under 1200	High[230]	Moderate	Low
1200 – 1600	High	Moderate	Moderate
Over 1600	High	High	High
SINGLE-CARRIAGEWAY ROADS			
Average Peak Hourly Flow per Lane (in flow units/hour1)	**Average Journey Speed km/hr (mph)**		
	Under 50 (31)	**50 – 70 (31-44)**	**Over 70 (44)**
Under 600	High	Moderate	Low
600 – 800	High	Moderate	Moderate
Over 800	High	High	High

Source: Design Manual for Roads and Bridges, Volume 11 Part 9.

[227] It was considered that the scale of effects (minor, moderate, major) described in Section 1.6 and used for other appraisals in the ES was not suitable for this chapter and has thus been adapted to help better understand the effects for travellers

[228] Traffic flows are measured in flow units where a car of light van equals one flow unit and HGVs or public service vehicles equal 3 flow units

[229] A car of light van equals one flow unit. A commercial vehicle over 1.5 tons unladen weight or a public service vehicle equals 3 flow units

[230] 'Moderate' in urban areas

The extent of stress induced in individual drivers will differ due to variations in their skills, experience, temperament, knowledge of the route and state of health. DMRB notes that, in principle, driver stress can be a factor in decisions on the traffic capacity to be provided for new schemes, though traffic capacity aspects will usually be the subject of more detailed engineering and traffic design investigations. The guidance suggests that for new or improved routes, designed in accordance with current standards, the appropriate category would normally be 'moderate' or 'low' for the whole route.

17.6 POTENTIAL IMPACTS

17.6.1 View from the Road

The permanent effects resulting from elements of the design of the scheme (see Section 17.7.1.1) would affect the operational effects for travellers. These can be summarised as:

- quality of scheme design including planting;
- opportunities taken in the scheme design to benefit the road user in views from the road; and
- obstruction of views by earth bunds, environmental barriers, adjacent structures and/or scheme planting.

17.6.2 Driver Stress

Permanent

- None perceived.

Construction

- Increased frustration for drivers resulting from delays caused by traffic management measures used to facilitate construction; and
- confusion for drivers caused by road works (narrow lanes; signs etc).

Operational

The potential stress impacts for drivers are described in Section 17.5.2. These can be summarised as:

- uncertainty;
- frustration; and
- fear.

The degree of impact on the A90(T) and the existing road would result from:

- the ease of the journey between Balmedie and Tipperty;
- the perception of increased safety (from provision of safe overtaking opportunities;
- the reduction in frustration caused by queuing and platoons of traffic; and
- quieter and safer roads for local travellers using the existing A90;
- driver stress resulting from accidents or maintenance activities in the future.

17.7 MITIGATION

17.7.1 View from the Road

Mitigation in terms of capturing benefits for travellers using the road and the views they experience and reducing negative effects is built in to the scheme design (see below) and the additional landscape and visual mitigation described in Section 11.7. The degree to which travellers benefit is always a balance between seeking to achieve pleasant views for the road user with the need to achieve other effective mitigation, and priority has been given in this design to mitigation for the existing receptors.

17.7.1.1 Road Design

The vertical alignment of the road (i.e. the extent to which cuttings and embankments are used) affects the extent to which travellers can see the landscape (and townscape) through which they are passing. This has been influenced by environmental considerations such as seeking to balance cut and fill, fitting the new road alignment into the surrounding topography, the need for noise barriers and planting and landscaping proposals to screen the road from nearby properties. The view from the A90(T) experienced by travellers would also be affected by physical roadside obstructions such as safety barriers, signs, lighting and acoustic barriers (bunding and fencing).

The mainline of the scheme would be in cutting deep enough to restrict views from the road from Orrock House until just south of Hill of Menie (ch1920 to ch2200) and again from Mill of Foveran to Pitmillan (ch5100 to ch7100). The A975 Newburgh Junction and the B9000 Junction would both be in cutting. Environmental barriers, particularly those needed to reduce traffic noise would be required in some locations along the scheme, and these would have potential to partially screen the view from the road anywhere with a barrier 1.5m high would restrict views from the road, 1.8m high would normally obstruct them). Further information on noise impacts and their mitigation is presented in Chapter 14 Noise and Vibration.

Landscape proposals have been developed to ensure that the road links with existing areas of landscape importance and vegetation, and to ensure that attractive vegetation typical of the local area is provided throughout the scheme. Planting would also be used in some areas of the scheme to make views into woodland areas which are more interesting for travellers. Where important views are provided by the scheme, in particular to the coast, the landscaping design would seek to ensure that these are maintained or enhanced where this does not compromise other required mitigation. Further information on scheme landscaping is provided in Chapter 11 and an outline landscape design for the scheme is shown on Figures 11.7a-h.

17.7.2 Driver Stress

Mitigation to reduce driver stress is embedded in the scheme design. The scheme design has taken account of traffic flows in the year of opening and 15 years after opening (i.e. 2025). In addition other specific mitigation measures which would be implemented to reduce negative effects during construction and after the road was operational would include:

VT1. The Contract Documents would define routes which could be used by construction traffic and on which HGVs would be allowed to travel on site related business.

VT2. Queue lengths would be checked during construction activities requiring contraflows by the contractor and the information used to inform traffic information outlets including the Traffic Scotland signs in the wider road network.

VT3. Use would be made of the local media (newspaper, radio and television) to warn local residents and road travellers in advance of construction work which may affect access to properties or which may cause delays to drivers and broadcasting of radio traffic bulletins on delays and queues on any strategic roads affected by construction works.

VT4. Information on delays on the network would be available to drivers from existing VMS installations on the strategic road network and a VMS on the new road once operational.

17.8 ASSESSMENT OF RESIDUAL EFFECTS

17.8.1 View from the Road

This section reports the effects of the scheme on travellers' views from the road taking account of the scheme design and committed mitigation measures. The predicted impacts on vehicle travellers in terms of the view from the road afforded by the scheme have been assessed for each component of the scheme and in terms of the overall scheme. In addition, consideration has been given to impacts on the view from the existing road network as a result of construction and operation of the scheme. Visual effects from scheme construction activities are set out in Section 11.9.

Impacts to vehicle travellers' view from the road have been assessed by route section, and the assessment is presented in Table 17.3. Effects have been considered in relation to the quality of the landscape through which the route passes and the extent to which this landscape would be visible from the road as determined by its physical characteristics including the extent to which cuttings and other barriers (e.g. noise fences) hinder the view from the road.

Table 17.3: Assessment of Impacts on View from the Road

Route Section	Key Views	Assessment of View from the A90(T)	Assessment of View from the Existing A90 with New Road in Place
Balmedie to Delfrigs	Upon leaving Balmedie the road sits upon embankment as far as South Orrock. At Orrock House the road goes into cutting until just south of Hill of Menie, which would be deep enough to obscure the view. After Hill of Menie the road returns to grade. New woodland planting would restrict views east to the coast	View from the road would be **good** from Balmedie to the cutting at Orrock with a section of open views to the coast, whilst they would be poor through the cutting. From Hill of Menie to Stoneyards there would be a short section with **good** views to the east but views to the west would be **poor** as they would be blocked by a noise barrier/bund and between Stoneyards and Dambrae the	There would be no change in the view from the road between Blackdog and Balmedie. View from the road would be **good** with open views to the coast until reaching Menie Estate where planting blocks the views to the coast

Route Section	Key Views	Assessment of View from the A90(T)	Assessment of View from the Existing A90 with New Road in Place
	until just South of South Orrock	view would be **poor** on both sides noise bunds and planting restrict views like a cutting effect	
Delfrigs to Rashierieve	Past Delfrigs the road would rise slightly with the rise of the land until Aikenshill. It is on embankment past Kirkhill and then drops down to Foveran	From Delfrigs to Aikenshill there would be **moderate** views with some planting screening. From Aikenshill northwards to Rashierieve the countryside opens out and the view from the road would be **good** and persistently unobstructed	View from the road would be **good** until just after Rashierieve where the A90(T) crosses to the east of the existing A90. From here to Foveran the view would be **moderate** as the new road would slightly obstruct the view to the coast
Rashierieve to Tipperty	From Rashierieve to Foveran the new works are gently graded out. Past Mill of Foveran the road is in cutting until opposite Pitmillan where it becomes at grade with the surrounding countryside. It rise again with the lie of the land coming into Tipperty	Views from the road would be **good** between Rashierieve and Foveran with occasional obstructions which add interest. From Foveran to Pitmillan the road is in cutting giving **poor** views. However once reaching Pitmillan the views until Tipperty are **good**	Views from the road would be **moderate** as they would be occasionally obstructed to the west by the new road

17.8.2 Driver Stress

The driver stress assessment of operational conditions has been carried out using the evaluation criteria in Table 17.2. The findings of the assessment for the existing A90 are presented in Table 17.4, and the results from the new A90(T) assessment in Table 17.5.

Table 17.4: Assessment of Existing A90 on Driver Stress

DIRECTION / SUB-LINK	YEAR	AM PEAK		PM PEAK	
		Flow Units per Hour	DMRB Rating	Flow Units per Hour	DMRB Rating
Northbound					
Balmedie to A975 Junction	2010	550	Low	2100	High
	2025	725	Moderate	2475	High
A975 Junction to Tipperty	2010	525	Low	1650	High
	2025	600	Moderate	2100	High
Southbound					
Balmedie to A975 Junction	2010	2150	High	650	Moderate
	2025	2600	High	850	High
A975 Junction to Tipperty	2010	1550	High	650	Moderate
	2025	1875	High	825	High

Table 17.5: Assessment of Proposed A90(T) Scheme on Driver Stress

DIRECTION / SUB-LINK	YEAR	AM PEAK		PM PEAK	
		Flow Units per Hour	DMRB Rating	Flow Units per Hour	DMRB Rating
Proposed A90(T) – Northbound					
Balmedie to	2010	275	Low	1000	Low

[231] Newburgh Junction

DIRECTION / SUB-LINK	YEAR	AM PEAK		PM PEAK	
		Flow Units per Hour	DMRB Rating	Flow Units per Hour	DMRB Rating
A975 Junction[231]	2025	375	Low	1200	Moderate
A975 Junction to Tipperty	2010	225	Low	700	Low
	2025	325	Low	1000	Low
Proposed A90(T) – Southbound					
Balmedie to A975 Junction	2010	1000	Low	325	Low
	2025	1150	Low	500	Low
A975 Junction to Tipperty	2010	550	Low	275	Low
	2025	700	Low	450	Low
Existing A90 route – Northbound					
Balmedie to A975 Junction	2010	30	Low	55	Low
	2025	35	Low	65	Low
A975 Junction to Tipperty	2010	40	Low	100	Low
	2025	50	Low	120	Low
Existing A90 route – Southbound					
Balmedie to A975 Junction	2010	40	Low	30	Low
	2025	45	Low	35	Low
A975 Junction to Tipperty	2010	150	Low	40	Low

17.8.2.1 Permanent

No permanent driver stress effects would result from the scheme.

17.8.2.2 Construction

Construction is estimated to last some 18-24 months (see Section 3.3.3). During this time the movement of construction vehicles and in particular HGVs may result in locally elevated traffic flows on routes used by construction traffic to access the working areas of the site. This is estimated be average approximately 80 HGV movements per day on the A90 at Balmedie, assumed to be the busiest section in terms of traffic generated by construction (see Chapter 13). The roads which could be affected are:

- the existing A90;
- the B977 linking the A90 with Belhelvie;
- the A975 linking the A90 to Newburgh;
- the B9000 to Newburgh and west to Pitmedden; and
- local roads linking the scattered settlements in the scheme area;

Vehicle movements on the main routes are shown in Figure 4.2. The roads are mainly single carriageway and thus additional heavy traffic could exacerbate driver stress quite rapidly. The predicted HGV movements for construction would not be great enough to result in significant changes in the average peak hourly flows shown in Table 17.4 and therefore the driver stress evaluation.

Impacts would be controlled by ensuring construction traffic uses the routes identified in the contract and adequate warning was provided to road users (through the media and using VMS information) and this would help reduce driver stress by being aware of issues in good time which would enable alternative planning of journeys if required.

Further away from the site construction traffic would spread out over a wider area and the effects on existing flows and patterns is considered also unlikely to

change levels of existing driver stress (the potential cumulative effects with other schemes are considered in Section 18.4).

17.8.2.3 Operational

The current A90 can be congested with platooning traffic (see Section 2.2) and this causes difficulties for overtaking and for those wanting to turn right across traffic onto the A90 and in particular for farm vehicles. This can cause driver stress and increases the potential for accidents. On completion, the new dual carriageway section is expected to provide relief in driver stress for travellers by providing a continuous dual carriageway route. As shown in Table 17.4, current stress on the majority of the A90 is assessed as 'High' for both southbound traffic in the morning peak and for northbound traffic in the evening peak. Travel in the opposite directions to these is less susceptible but the calculations show that levels in 2010 that are either 'Low' or 'Moderate' would rise to 'High' by 2025 in the evening peak period. Table 17.5 illustrates that with the scheme in place, driver stress levels would reduce to a 'Low' rating. By 2025, only the northbound carriageway from Balmedie to the A975 junction in the PM peak period would have risen to a 'Moderate' rating, though it should be noted that the 1200 flow units per hour is the minimum flow for the 'Moderate' rating (see Table 17.2). The assessment revealed that at other times and on other sections of the road, the driver stress would be well below that identified in Table 17.2 as the 'Low' rating. It can be said that the benefits are therefore predicted to be most noticeable at time of opening and the early years of operation.

Driver stress to users of the existing A90 once the new dual carriageway is operational is predicted to reduce from a 'High' rating to a 'Low' rating because of significantly decreased traffic flows and therefore reduced congestion and better overtaking opportunities.

The new road has been designed to relevant standards which would help reduce the risk of disruption to operational traffic during events such as accidents or maintenance.

17.9 SUMMARY

The effects of the scheme on vehicle travellers can be summarised as follows:

17.9.1 View from the Road

- Views from the road would be good along the A90(T) apart from where the road enters cutting and where a noise barrier would block the view.
- Views from the existing A90 would be good until just south of Foveran where the A90(T) crosses the existing road. From here the views would be moderate as they would occasionally be blocked by the A90(T).

17.9.2 Driver Stress

- There could be some additional stress for drivers during construction resulting from construction traffic in particular from HGVs and due to temporary traffic management measures required to facilitate the scheme construction.
- Driver stress levels on the existing A90 are assessed as High.
- Driver stress levels with the scheme would initially be Low and are predicted to reach the threshold of the Moderate criterion in some locations by 2025.

18 SUMMARY OF EFFECTS

18.1 INTRODUCTION

This chapter presents a summary of the key findings of the assessment of the environmental effects of construction of the scheme. In Section 18.2, the significant residual environmental effects of the proposals are reported assuming all mitigation set out in the ES and collated in Annex B would be delivered. A summary of the environmental effects of the project is also presented in the environmental impact tables presented in Annex C. Section 18.3 summarises the effects of the proposals on the Ythan Estuary. Cumulative effects of the proposals are considered in Section 18.4.

18.2 SUMMARY OF SIGNIFICANT EFFECTS

18.2.1 Traffic

- The proposed A90 dualling from Balmedie to Tipperty would provide the missing link in a dual carriageway running from Aberdeen to Ellon and would improve the strategic transport network in the area.
- The provision of this new infrastructure would improve the reliability and safety of journeys for all users, including freight and public transport services and local traffic.
- During construction there could be some 6% increases in daily HGV movements on the A90 between Balmedie south and north junctions over a 24 week period as earth is moved from the site of the new Balmedie Junction to the rest of the site.
- At other times during the contract there would be increases in traffic as result of construction related activities but these would be less than the increases during the earthworks.
- The scheme construction would be undertaken with minimal disruption to existing traffic on the local road network. Whilst some disruption is inevitable, traffic management strategies would be planned in advance and implemented to minimise disruption. There would be some local traffic effects where the new road crosses existing roads. However, the effect of any restrictions would be minimised by undertaking construction in a sequential manner.
- The traffic effects have been appraised on the basis of a transfer of traffic from the existing trunk road. No significant induced traffic effects are anticipated. Annual Average Daily Traffic (AADT) flows on the A90(T) is predicted to be up to 23,200 in 2010 and 28,700 in 2025.
- The traffic on the existing A90 would reduce from around 20,000 AADT to around 1,000 AADT on opening of the scheme in 2010.

18.2.2 The Transport and Planning Policy Context

- The proposed scheme broadly complies with National Government guidance and Structure and Local Plan policies.
- Mitigation has been defined for any potentially significant impact on the environment to ensure that any residual effects are reduced to the minimum for safe implementation of the development.
- The scheme has been designed to take account of future development in Balmedie, Foveran and Tipperty. However 0.93ha of land designated for employment use and strategic landscaping would be lost south of Balmedie.

- Although the proposed scheme does not actively promote a modal shift to more sustainable modes of transport, the scheme would not lead to an increase in traffic on the road.
- The eastern half of the Balmedie Junction and the Easter Hatton Link would touch on the area designated as undeveloped coast. This is unavoidable because of the location of the existing road and the effects are not considered significant.
- There would be moderate adverse effects on the setting of Hare Cairn SAM and Orrock House (A Listed Building). The landscape design has sought to minimise effects but they cannot be fully avoided because of the elevated position of the sites above the new road.

18.2.3 Land Use and Property

- The construction of the scheme would result in a change of landuse of 150.18 ha[232].
- There are some 424 properties within 300m of the scheme of which some 398 are residential and 26 are commercial.
- No property demolitions would be required for construction of the scheme. Some 0.021ha of land from the garden of No 6 The Holdings, and some 0.12ha from the gardens of three properties at South Folds would be lost. These effects are considered to be major adverse.
- There would be a moderate adverse effect at East Aberdeenshire Golf Club where the driving range would be lost to facilitate construction of a new link to the Balmedie Junction.
- Other effects of the proposals would not be significant in terms of land use change.
- Access to all properties would be maintained during construction and operation of the scheme.
- Access across the scheme corridor would be improved by the provision of safe crossing points of the A90(T) and from reduced traffic on the existing A90.

18.2.4 Agriculture, Forestry and Sporting Interests

- There are 28 agricultural, commercial forestry and sporting land interests which would be affected by the proposals. These collectively farm some 1,994ha.
- The proposed development has adverse residual effects (moderate or above) on 20 land interests (71%). It is predicted that viability would be compromised on one unit, Seven Acres, Land Ref 29.
- It is estimated that 117.68ha of agricultural and commercial forestry land would be subject to compulsory purchase and purchase by landowner agreement to construct the proposed scheme. Some 16.80ha would be available to be returned to agriculture reducing the net loss of agricultural land to 100.88ha. This includes 20.72ha of Prime Agricultural Land; 68.37ha of non-Prime Agricultural Land and 11.79ha of forestry and woodland.
- Farmers would be financially compensated for the value of land lost and for injurious affection and disturbance.

[232] All landtake figures in the ES are approximate as exact figures would depend on the details of the final design.

18.2.5 Geology and Soils

- No sites designated for their geological interests would be affected by the proposals.
- No geological resources of particular significance have been identified which would be affected by the works and no significant effects are predicted.
- No significant areas of contaminated land have been identified which could be affected by the works.
- Implementation of best management practices including good design of the works would ensure that any impacts to soils were minimised.

18.2.6 Road Drainage and the Water Environment

- No significant residual effects on, or changes to, the hydrological and hydrogeological environments within the proposed scheme corridor are predicted to occur as a result of the scheme, providing that the committed mitigation measures are implemented.
- Providing that SEPA guidance and best practice requirements are followed during construction and pollution prevention measures implemented (including for the storage and handling of hazardous materials, the management of site run-off, the management of site compounds and domestic sewage, waste disposal and site restoration) the construction of the scheme is not predicted to result in significant adverse effects to the aquatic environment.
- Localised pumping of groundwater may be required during construction. There would be no requirement for major dewatering that would be significant to the overall hydrology of the area.
- The proposed works and drainage from the construction site are therefore not predicted to significantly affect water quality of receiving watercourses including the Ythan.
- The outline design for the scheme has been developed in accordance with the requirements of SEPA and following best practice and SUDS guidance. Checks have been made of the effects of run-off and the calculations indicate potential impacts would not be significant. The contract would require that all detention ponds, filter drains and other SUDS systems were installed and maintained successfully and it is therefore not predicted that any significant adverse effects on surface water and groundwater quality would occur as a result of the routine operation of the scheme.
- The mitigation measures proposed for the schemes that include filter drains, detention ponds, and other SUDS measures would help to mitigate the impacts from extreme pollution events. The ponds would hold large volumes of run-off and contaminated water, allowing time for pollution response plans to move into action and resultant cleanup to take place. In addition, catchment drainage plans, contingency plans, emergency response procedures and joint response plans (involving other organisations that may be involved in the event of a spill) would be developed for the scheme in accordance with SEPA guidance.

18.2.7 Ecology and Nature Conservation

- No statutory designated sites would be directly impacted on by the proposals.
- The proposed scheme lies within 3km of the Ythan Estuary which is designated for its international nature conservation value. Implementation of best management practices during construction and design and implementation of effective drainage features including detention ponds and

other SUDS measures would ensure that there were no significant indirect effects on the estuary.

- The qualifying features of the sites (Special Area of Conservation; Special Protection Area and Ramsar site) would not be affected by construction or operation of the scheme.
- No habitats or plant species of particular note have been identified in or in proximity to the route corridor. Generally the habitats along the route are common in the area and of limited nature conservation value. Their loss is not considered to be significant.
- Habitat creation includes approximately 12.8 hectares of native woodland and scrub planting; 26.5 hectares of grassland including some wildflower grassland; and eight new detention ponds (3.1 hectares) with associated wetland habitat.
- Badger and otter activity have been identified along the route corridor however otter are considered only to pass through and no badger setts have been located within 30m of the proposed scheme. Suitable mitigation would be implemented during construction and otter and badger passes and fencing would be incorporated into the detailed design of the scheme to reduce the potential for severance effects from the new road.
- A variety of birds have been identified as breeding in the scheme corridor or in proximity to it but no significant effects to any have been identified.
- The new landscape proposals have been designed to provide a range of habitats for birds and other animals and have potential to enhance local biodiversity in the longer term.

18.2.8 Landscape and Visual

- The proposed road runs through a rural landscape which is generally small scale and rolling in the area south of the ridge at Aikenshill. North of this ridge, the landscape becomes much broader, more open and large scale (see Photograph 15). Development is concentrated at Balmedie, Foveran and Tipperty but there is a broad scatter of groups of houses and of individual houses throughout the area.
- In the southern half of the area, the new road would create a strong north-south feature in a landscape which has a generally east-west grain. In the northern half of the area, the new main road would run parallel to the existing road reinforcing the north-south axis which already exists.
- There are few strong landscape elements such as woodlands affected by the new road, although the pattern of small field boundaries in the southern half of the area would be disrupted.
- The scattered nature of development leads to a similar scattering of visual impacts. As far as possible, the new road has been designed to sit low in the landscape and, in particular, all junctions have been designed so that the main road with its high load headroom requirements passes over the side roads. This has minimised the extent to which structures stand up in the open landscapes and reduced the potential visual impact of the junctions.
- In most situations the residual effects of the scheme would be more related to the proximity of the new road and its intrusion into a rural or semi-rural landscape rather than to the actual obstruction or blocking of views by the road or structures.
- At the scale of the landscape character areas defined for this study, the new road would have a moderate adverse effect on the landscape of the southern half of the study area during the construction period.

- At a more local scale, there would be a major adverse effect during the construction period on the landscape of the more enclosed and self-contained valleys such as that to the west of The Holdings or the valley of the Menie Burn around Dambrae.
- These effects would all reduce over time as the mitigation matures, such that the eventual overall landscape effects would be minor, although in local areas they would remain moderate.
- The road when new would have a major adverse visual effect on No 6 The Holdings, on the Cock and Bull restaurant and the two adjacent cottages, on Seven Acres and Stoneyards Cottages, and on Blair Lodge at Kirkhill. Except at No 6 The Holdings, the visual effect would reduce to moderate adverse as the mitigation planting matures and partially screens the traffic. At No 6 The Holdings the effect is likely to remain major although this may be able to be reduced depending on the outcome of the detailed mitigation design exercise.
- There would be moderate adverse visual effects at the time of road opening from the new A90(T) road, or from the minor link roads, at: the clubhouse for the East Aberdeenshire Golf Club; at South Folds and at the Holdings; at Old Road in Balmedie; to most of the properties west of the old road and within about 300m of the new road from Balmedie to Hill of Menie, including Orrock House; to Stoneyards and Cowhill; to the line of houses at Aikenshill (see Photograph 14) and; to Mill of Foveran and Ardgill. Where mitigation planting is proposed, this effect would generally reduce over time to minor adverse. On the other hand in the open landscapes where screen planting would be inappropriate, such as at Orrock House and at Aikenshill, this effect would remain unchanged except in so far as perceptions of change reduce as the viewer gets used to the new view.
- There would be moderate beneficial impacts on most of the properties immediately abutting the existing A90 when traffic transfers to the new road, and at The Bungalow, just north of Balmedie, there would be a moderate beneficial impact when the mitigation planting on the site of the grubbed up old road has developed.

18.2.9 Archaeology and Cultural Heritage

- There are 90 sites, of which ten have statutory protection, of archaeological or historic interest in the study corridor.
- These include two SAMs and eight listed buildings.
- A review of the historical background of the area shows that the area has undergone substantial pre-historic and historic development. This would indicate that there is the possibility for further unidentified archaeology in the area.
- The A90(T) would have a direct physical impact on six sites of local importance. Only two of the sites in question would be destroyed. In the remaining four sites it is likely that there would only be partial loss of the site.
- The setting impacts of the ten sites with statutory protection have been considered. There would be moderate adverse effects on the settings of Hare Cairn SAM and Orrock House and Gatepiers and minor adverse effects on Orrock House Dovecot and the Mill of Foveran. There would be no effect on Balmedie House Lodge, Balmedie House, Menie House and Temple Stones, a minor beneficial effect on Belhelvie Old Parish Church and a moderate beneficial effect on Menie House Lodge.
- Where it has not been possible to avoid a physical impact on a site, the site would be revealed/excavated to determine whether there would actually be

an impact by the route. If the archaeology was unavoidable then it would be excavated and recorded to a suitable standard. Where the site is upstanding, rather than buried archaeology, it would be recorded to a suitable standard.
- The two sites that would be destroyed are upright stones and would be relocated to a similar location nearby rather than being entirely removed.
- Any impacts on unidentified archaeology along the route would be mitigated by intrusive survey (possibly also geophysical survey), excavated and recorded to a suitable standard.

18.2.10 Disruption due to Construction

- The increase in traffic on the local network during the period of construction likely to generate most movements (earthworks) would not be significant.
- Disruption to traffic would cause an increase in journey times at some stages of scheme construction such as during the tie-ins of the existing and new dual carriageways when contraflow working could be required.
- Construction activities and storage of materials would be carried out within the land acquired for the scheme.
- Use of haul roads internal to the site would be maximised which would reduce the impact of construction traffic on the local road network.
- Traffic management proposals would be developed by the contractor to minimise impacts.
- Some local roads would require to be diverted locally to allow construction. These would be clearly signed and access to all properties would be maintained.

18.2.11 Noise and Vibration

- A detailed baseline noise survey of the study area identified that the key noise source is local road traffic with additional contribution from helicopter pass-bys and natural sources such as wind rustling vegetation.
- No permanent, e.g. completely non-reversible noise and vibration effects are predicted to arise as a result of the scheme, with identified impacts being classified as either operational, or construction related.
- Noise mitigation design was undertaken as part of the iterative design process for the scheme, resulting in a number of noise mitigation measures being incorporated.
- During the construction phase, temporary noise effects are predicted to arise ranging in significance from minor to moderate.
- During the construction works, where the potential for perceptible vibration levels is identified at local receptors, vibration monitoring would be undertaken to allow effects to be appropriately determined and controlled to within acceptable levels.
- Temporary effects ranging major adverse to major beneficial would arise as a result of localised traffic diversions during the construction phase.
- In general, slightly greater noise level changes are predicted for the 2025DS versus 2010DM scenario compared to the 2010DS versus 2010DM scenario as a result of the inclusion of natural traffic growth.
- In the south-west region of the Core Study Area (in the vicinity of Drumhead), lower noise level changes are predicted for the 2025DS versus 2010DM scenario due to lower traffic flows in this area if the Aberdeen Western Peripheral Route is constructed.
- Within the Core Study Area, the majority of receptors would be subject to minor noise level increases both with and without the scheme.

- Within the Core Study Area, accounting for natural traffic growth and the effect of the scheme, noise effects are predicted to range from >15dB decrease (major beneficial) to between 5 and 10dB increase (major adverse), with the majority of receptors subject to minor noise level increases.
- Within the Core Study Area, accounting for natural traffic growth and the effect of the scheme, 3 industrial receptors are predicted subject to a moderate noise level decrease with no industrial receptors subject to moderate increases, major increases, or major decreases.
- Within the Core Study Area, accounting for natural traffic growth and the effect of the scheme, 2 community facility receptors are predicted subject to moderate noise level increases, 1 subject to minor increases, 2 subject to moderate decreases and 2 subject to major decreases.
- Within the Core Study Area, accounting for natural traffic growth and the effect of the scheme, 20 residential receptors are predicted subject to adverse effects of major significance, 16 subject to adverse effects of moderate significance, 16 subject beneficial effects of moderate significance and 39 subject to beneficial effects of major significance.
- Overall, within the Core Study Area, following the opening of the scheme and including for natural traffic growth, greater noise level decreases are predicted than noise level increases at local receptors.
- Within the Wider Study Area, noise effects as a result of the scheme are predicted to range from minor adverse, to major beneficial. Including for natural traffic growth, effects are predicted to range from moderate adverse to major beneficial.
- Effects at Scheduled Ancient Monuments and Listed Buildings are predicted to range in significance from moderate adverse to major beneficial, with greater beneficial effects being predicted overall.
- For the Core Study Area, the majority of adversely affected receptors are predicted to be subject to a change in noise nuisance of between +20 and +30%, but this is primarily as a result of the scheme opening. Twenty nine receptors are predicted subject to an increase of greater than 30%, with 36 predicted subject to decreases of greater than 10%.
- Approximately 45 properties have been identified which could qualify for noise insulation measures through the provisions of the Noise Insulation (Scotland) Regulations.
- For the Core Study Area, greater numbers of receptors are predicted to be subject to decreases in vibration nuisance than increases. Also, the magnitude of the decreases is generally greater than that associated with the increases.

18.2.12 Air Quality

- Air quality within the study corridor is good. There are no Air Quality Management Areas in Aberdeenshire. Concentrations of all pollutants considered in this review were found to be well within the statutory objectives.
- The main impacts during construction would result from emissions of dust and PM_{10}. These impacts would be minimised by implementing best management practice on site and overall the effects are considered to be minor adverse (not significant).
- The results of the local air quality assessment for the operational phase were that seventy five properties within the study corridor would experience minor beneficial effects on air quality due to the scheme and 11 would experience

minor adverse effects. Concentrations at all properties would remain well within the statutory objectives.

- The main effects of the scheme on total emissions during operation is an increase of CO_2 and NOx emissions associated with the scheme in 2010 largely due to an increase in the length of road sections that make up the total route assessed. Emissions of NOx are predicted to decrease with time from the 2005 baseline scenario due to general improvements in vehicle and fuel technology.
- Overall, the scheme would have positive effects on air quality for the local population.

18.2.13 Pedestrians, Cyclists, Equestrians and Community Effects

Key findings of the assessment of effects on journeys made by pedestrians, cyclists, equestrians and local traffic resulting from the scheme are:

- Access for all properties near the scheme and users of local roads to community facilities would be maintained for all modes during construction and operation of the scheme.
- Two new footways would be provided which would improve safety for pedestrians travelling to Balmedie from the west side of the A90:
    - from the link from The Holdings on to the B977 link and through the underpass to Balmedie; and
    - beside the Millden Link Road from the golf course to the roundabout and then to join with the path from The Holdings into Balmedie.
- The current crossing to The Holdings from Balmedie would be closed up. A safer alternative would be provided by the new footway from The Holdings.
- A small number of properties would experience effects to their access to community facilities in Balmedie and Tipperty as a result of the scheme. These effects would include a longer journey distance and time taken to access community facilities.
- There would be moderate adverse effects on vehicle journey lengths from The Holdings, Belhelvie Church, Belhelvie Community Centre, residential properties in Belhelvie, Drumhead Cottage, Drumhead Lodge and Fornety to access Balmedie and Tipperty.
- For pedestrians there would be major permanent adverse effects on journey length from The Holdings, Belhelvie Church, Belhelvie Community Centre, residential properties in Belhelvie, Drumhead Cottage, Drumhead Lodge, Kirkhill, Easter Hatton and Fornety to access Balmedie and Tipperty.
- For cyclists there would be a major permanent effects on journey length from Drumhead Lodge and Fornety to access Balmedie and Tipperty.
- During scheme construction there might be some significant adverse effects on access for local communities because of the need to use diversionary routes. These would be temporary.
- Once the new road was operational there would be significant community benefits from the reduction in traffic on the existing A90 allowing easier and safer local journeys by all modes.

18.2.14 Vehicle Travellers

- Views from the road would be good along the A90(T) apart from where the road enters cutting and where a noise barrier would block the view.

- Views from the existing A90 would be good until just south of Foveran where the A90(T) crosses the existing road. From here the views would be moderate as they would occasionally be blocked by the A90(T).
- There could be some additional stress for drivers during construction resulting from construction traffic in particular from HGVs and due to temporary traffic management measures required to facilitate the scheme construction.
- Driver stress levels on the existing A90 are assessed as High.
- Driver stress levels with the scheme would initially be Low and are predicted to reach the threshold of the Moderate criterion in some locations by 2025.

18.3 EFFECTS ON THE YTHAN ESTUARY

The proposed scheme lies within 3km of the Ythan Estuary which is designated for its international nature conservation value (Special Area of Conservation; Special Protection Area and Ramsar site). The sites would not be directly affected by the proposals. The Foveran and Tarty Burns drain to the Ythan and could be affected by construction and operation of the scheme. Implementation of best management practices during construction and design and implementation of effective drainage features including detention ponds and other SUDS measures would ensure that sediment rich or polluted run off was attenuated and there were no significant indirect effects on the estuary (see Section 9.9). The qualifying features of the sites would not be affected by construction or operation of the scheme.

18.4 CUMULATIVE EFFECTS

18.4.1 Introduction

The potential for combined and cumulative environmental effects from the proposed project has been considered at two levels:

- the combined and interactive effects of the different aspects of the project on the various environmental resources and receptors which have been assessed; and
- the cumulative effects of the project with any other approved projects which have been identified in the vicinity of the proposals.

18.4.2 Cumulative Effects of the Scheme

The construction of 9km of dual carriageway and associate infrastructure would inevitably have cumulative effects in terms of changes in land use, landscape and visual impacts. The effects would reduce as mitigation planting matures and the scheme becomes an accepted part of the landscape.

In total some 106.27ha of grasslands, field margins, woodlands and scrub and two ponds would be lost to the proposals. The scheme drainage proposals would include eight new detention ponds which would be designed to enhance local nature conservation in the longer term. Similarly the 59.66ha of new planting would be designed to enhance local biodiversity in the longer term.

Traffic patterns would be changed by the new road with greatly reduced flows on the existing A90 in the area of the proposals. This would benefit properties near the road in terms of noise, air quality and severance. Properties closer to the new road would have adverse effects in terms of noise and air quality. Severance effects would be mitigated by the new crossings. Overall the

appraisals have indicated that more properties benefit in terms of noise and air quality than are disadvantaged.

18.4.3 Cumulative Effects of Parallel Projects

No significant proposals have planning consent in the locality of the scheme. There are proposals for a major new development at the Menie Estate (including a residential hotel, golf courses and properties) and also quarry proposals at South Orrock (see Section 5.6). Neither project is consented. The proposals for the Aberdeen Western Peripheral Route (AWPR) are also being taken forward currently by Transport Scotland and the draft Orders and ES have been published for public comment. If any of these projects are consented and construction was to begin concurrently with the A90(T) proposals there would be cumulative effects and in particular from traffic associated with the projects on the road network (construction traffic for the Menie Estate and the AWPR and HGVs from the quarry). Disturbance effects could be greater than if only the A90(T) was being built. People and wildlife could be more disturbed than by a single project by traffic, noise, dust etc. However, each project would have conditions which had to be adhered to during construction and operation. These would be set out in the respective consents for each project. The measures would reduce the potential for significant effects on the environment and these measures if successfully implemented would mitigate the potential for cumulative impacts to some degree because the significance of effects from each single project would be controlled.

It is likely that most (if not all) projects would be required to include landscaping proposals to help integrate the new developments into the surrounding landscape and to mitigate effects on biodiversity. The nature conservation interests of the A90 corridor are quite limited in the vicinity of the proposals and any enhancements to local biodiversity near the scheme could be of benefit to local nature conservation interest. All new projects would have to demonstrate adequate drainage and flood protection measures including SUDS (where appropriate) and cumulative effects are not predicted in terms of quantity or quality of discharge from the A90 proposals when combined with these other potential new developments.

ANNEX A

EIA CONSULTATION RESPONSE TABLE

TABLE A1: EIA CONSULTATION RESPONSE TABLE

Organisation	Date	Name	Information/Contents	Response/Comment
Aberdeen Bat Group	29.11.05	Isobel Davidson	• There are one or two reports of small bat roosts in houses near the route corridor, but the Bat Group are not aware of any which will be directly affected. The only significant tree line appears to be at Southlea House and this should be checked for use by foraging and roosting bats before any trees are removed • Stated that she could not see any evidence of buildings being demolished but any buildings or other structures which are to be demolished should be checked for roosting bats first. Noted that Aberdeenshire Council Natural Heritage Team can give relevant information about designated sites etc	• A bat scoping survey has been carried out and no areas of potential bat interest identified (see Section 10.5.4) • No buildings are to be demolished as part of the proposed scheme
Aberdeen City Council Archaeology Keeper	29.11.05	Judith Stones	• Covers Aberdeen, not Aberdeenshire. Gave contact details for the Aberdeenshire Archaeology Service – moira.greig@aberdeenshire.gov.uk	• Aberdeenshire Archaeology Service contacted, see response
Aberdeenshire Council	4.11.05	Meeting with Jane Flight	• Gave information on the major applications and enquiries along the main route corridor • Gave details of areas of constraints and interest along the route corridor • Gave useful contacts within Aberdeenshire Council	• All information taken into account in relevant chapters
Aberdeenshire Council Planning	7.11.06	Phone Call with Jane White of Planning Department	• Confirmed that there are no approved planning permissions in the vicinity of the route • Drew attention to an application for houses at Drumhead that have been refused but are appealing (ref app/2006/2356) • Advised that by the time the ES goes to publication the Menie Estate proposals may be in. Ring to check closer to the time	• Noted • Menie Estate proposals have been submitted but not approved
	29.6.06	Meeting with Aberdeenshire Council Planners	• Purpose of the Meeting to update Aberdeenshire Council (AC) planners on progress of Balmedie to Tipperty Upgrade proposals and to discuss options and in particular the significance of the effects of options which affect the Menie Estate • The Menie Estate application and its implications to the scheme discussed – application not expected before July and therefore not included in the options appraisal • Noted that the proposal for the quarry near Balmedie is to be decided in near future • Aberdeenshire Council would consider any proposal which split the gate house from the main house at Menie as significant and there would be a presumption against it unless there were no other options available. Any building which was built within the curtilage of a listed building before 1948 would be treated as a listed building in any consideration of effects even though the property is not listed in its own right • It was agreed that options which limited effects to properties and avoided sandwiching properties between roads were more attractive than ones with significant effects to properties	• All information taken into account in the relevant chapters • Option 5, which avoids severing Menie House from the gate lodge was taken forward as the preferred route
	02.02.07	Jane White	• Advised that there were no active planning applications within the scheme area (pers. comm.)	• Noted

Organisation	Date	Name	Information/Contents	Response/Comment
Aberdeenshire Council Environment Team	20.01.06	Nic Ananin	**Access** • Scottish Executive has a policy of provision of cycling facilities in conjunction will all new trunk road developments. This should be implemented by means of a pathway suitable for use by all non-motorised users (NMU) on one or both sides of the new road • In the interest of general access provision, and also of the forthcoming Aberdeenshire Core Paths Plan, underpasses and overbridges should be provided across the new road for NMU use at appropriate points • Any paths, tracks or private roads severed by the new road are de facto public access routes and provision must be made for users to cross the new road, preferably by grade-separated means	• No specific cycle provision with the new road as the existing A90 can be used (very decreased traffic flows) • Accesses have been provided at appropriate points, see Chapter 15 • • Provision has been made for users to cross the new road where paths, tracks or private roads are severed. See Chapter 16: Pedestrians, Cyclists, Equestrians and Community Effects
			• EIA: The EIA should include a separate schedule of environmental commitments which specify effects being mitigated, identifying the location design and timing of mitigating measures, state the extent to which the environmental impacts will be reduced and explain long term monitoring arrangements in accordance with sections 58-61 of PAN 58 (Environmental Impact Assessment) • The EIA should identify environmental baseline qualities across the site by means of a habitat survey including tree survey if any trees and woodland will be affected by the proposal. The tree survey should be carried out to BS3998 and BS5837 in relation to construction. The tree survey should also form part of the site layout decision making process and be the basis for a woodland part of the site management plan	• See EITs in Annex C and collated mitigation in Annex B
			Landscape: • Site is affected by two landscape designations, 'Undeveloped Coast' and 'Area of Landscape Significance'. Noted details of the policies can be found in the Aberdeenshire Local Plan. Stated the current A90 road alignment forms part of the western boundary for the 'Undeveloped Coast' designation, and by the nature of the visual impact, the character of the Area of Landscape significance will probably be affected by the development due to the designated area's relatively close proximity to the road line options. It is important that the proposed road line is carefully located and designed in detail to minimise landscape and visual impact • Balmedie House and Menie House are included in the Extended Inventory of Gardens and Designed Landscapes for Gordon District (local inventory) which means that the intrinsic qualities of the original estate landscape character should be identified, conserved and developed. • The SNH Landscape Character Assessments should be referred to in the EIA	• The impacts of the scheme on the designated landscapes have been considered in Section 11.9.2) • Noted (see Section 11.4.2) • Document used
			• The EIA should aim to give a clear and objective analysis for the existing topography, designed levels and potential volumes of material to be moved in relation to establishing the road. • The road should be designed to fit with existing landform and have least impact on existing designations and habitats etc • There should be a design emphasis on environmental best practice which should see the road located in areas least damaging to the environment and feature significant levels of mitigating landscaping and screening. Landscape and visual impact mitigation should be developed in	• All taken into account and reposted in Chapter 3: The Project Proposals and Chapter 11: Landscape and Visual Effects

Organisation	Date	Name	Information/Contents	Response/Comment
			accordance with principles outlined in the Guidelines for Landscape and Visual Impact Assessment second edition. All landscaping, as far as practical, should be appropriate to the local landscape character and be based on the list of native planting	
			Lighting: • The applicant needs to supply details, as part of the EIA, of any lighting proposals for the development. Light pollution is an issue which is of increasing concern in relation to environmental impact	• See Section 3.2.2.8
			Water Quality: • Engineering works which affects any watercourses or water bodies will need to be specified to meet current SEPA guidelines. SEPA should be consulted about any work involving existing or proposed water bodies	• SEPA consulted and effects on watercourses and waterbodies reported in Chapter 9: Road Drainage and the Water Environment
			Archaeology: • Advised that there would need to be an archaeological evaluation along the route (pre-development) together with a watching brief for anything revealed during the process of topsoil stripping and excavation	• Mitigation strategy reviewed by Historic Scotland and include in Section 12.7
Aberdeenshire Council Environment Team	14.11.06	Nic Ananin	• Stated the Rights of Way that could be affected are 2 near the junction south of Tipperty. In the consultation maps it appears that the junction connects in with the rights of ways and does not obstruct them. The rights of way are called GG91 and GG72	• Information included in Chapter 6: Land Use and Property
Aberdeenshire Council Environmental Health Officer	27.10.06	David Cooper	• Concur with WSP's proposal to consider NO_2 and PM_{10} concentrations as part of the assessment • Advise that if air quality measurements are to be undertaken then the Cock & Bull Inn, Foveran School and Fountainbleu are suitable monitoring sites • There is a current planning application for a quarry at South Orrock • Agree that background concentrations from the NAQIA will be appropriate for use in the assessment • Are unaware of any other sources of emissions factors that are more specific to the locality than those presented in the national guidance • Not aware of any NO_x or NO_2 conversion factors that are more specific to the locality than those presented in the national guidance • Advise that a large golfing resort development is planned for the area which may have an impact on road traffic numbers	• All information taken into account in appraisal in Chapter 15: Air Quality
Aberdeenshire Council Environmental Health Officer	01.11.06	Colin Nicholl	• Although there are operations both existing and proposed along the route of the proposed dual carriageway with the potential to cause noise nuisance (i.e. monumental stonemason business at Rashierieve, Foveran, engineering/fabrication business at Rashierieve, Foveran and proposed sand and gravel quarry at South Orrock, Balmedie) no complaints of noise nuisance have been received from these premises	• All information taken into account in appraisal in Chapter 14: Noise and Vibration

Organisation	Date	Name	Information/Contents	Response/Comment
			• In the case of the monumental stonemasons, conditions regarding noise emissions have been included in the planning approval while in the case of the quarry if planning approval is granted, it will be subject to conditions regarding noise • With regard to "Local Plans" there are no noise constraints within these documents	
Aberdeenshire Council (Access)	20.1.06	Colin Miller, forwarded onto Nick Ananin	• See Environment Team Response (20.01.06 e-mail)	• Information used in Chapter 12: Archaeology and Cultural heritage • Mitigation strategy set out in Section 12.7
Aberdeenshire Council Archaeology	12.12.05	Moira Grieg	• Sent details of archaeological sites and Scheduled Ancient Monuments in the study area. They recommend that the developer funds a two phase project: Phase 1 – Desk based assessment with a 10% evaluation by a professional archaeologist. Phase 2 – watching brief during topsoil removal and full recording of any further archaeological features uncovered • Also fund the study of any artefacts and samples from excavated features and the reporting. Includes a list of people within Aberdeenshire Council she would recommend consulting. See also Environment Team Response (20.01.06 e-mail)	•
	14.6.06	Moira Greig	• Referenced "negative suspensive condition (paragraph 34 of PAN42)" No development shall take place within the development site until the developer has secured the implementation of a programme of archaeological works in accordance with a written scheme of investigation which has been submitted by the applicant, agreed by the Aberdeenshire Council Archaeology Service, and approved by the Planning Authority. Thereafter the developer shall ensure that the programme of archaeological works is fully implemented and that all recording and recovery of archaeological resources within the development site is undertaken to the satisfaction of the Planning Authority in agreement with the Aberdeenshire Council Archaeology Service	• Noted. Historic Scotland would be involved in agreeing final mitigation as a trunk road scheme
	11.07.06	Bruce Mann	• Bruce Mann (Assistant Archaeologist) responded enclosing extracts from the Sites & Monuments Record of the known archaeological sites within the area, noted that if we require a GIS compliant overlay, such as shapefiles, they are happy to provide those	• Information noted and used in Chapter 12: Archaeology and Cultural Heritage
Aberdeenshire Council (Contaminated Land)	06.01.06	Anne Coles	• The Council has no information on any potentially contaminated land on or adjacent to the proposed trunk road upgrade. Further stated there is no registered contaminated land on or adjacent to the course of the proposed road. Advised the consultation of historic maps to determine areas of potentially contaminated land which may require investigation	• Information noted and used in Chapter 8: Geology and Soils
Aberdeenshire Council (Environmental Planner)	17.1.06	Linda Mathieson	• See Environment Team Response (20.01.06 e-mail) Linda Mathieson stated that she will not be responding directly and that Nick Ananin the Natural Heritage Planner for the Area is coordinating and submitting a response on behalf of the Environment Section	• Noted
Aberdeenshire Council (Flood & Coastal Protection)	8.12.05 and 13.12.05	Alasdair Smith and Malcolm Taberner	• None of the watercourses in the area have had significant flooding problems in recent years. Has passed letter to Judith Cox and Isobel Davidson (Planning and Environmental Services)	• Information taken into account in Chapter9: Road Drainage and the Water Environment

Organisation	Date	Name	Information/Contents	Response/Comment
Aberdeenshire Council (Landscape)	20.1.06	Peter Fraser	• See Environment Team Response (20.01.06 e-mail)	-
Aberdeenshire Council (Natural Heritage)	20.1.06	Fiona Chirnside	• Nick Ananin stated that response from Fiona Chirnside and Shaun Norman have already been included in the response sent by Mark Peters on the 7th December	• Noted
Aberdeenshire Council (Transportation & Infrastructure)	8.12.05	Ian Rendall and William Murdoch	• Initial response indicating received consultation and will look into it urgently Forwarded on information from colleague William Murdoch • William Murdoch stated the only two things worthy of note are the presence of oil/gas pipelines and SEPA's enhanced role. The St Fergus Mossmoran Shell pipeline crosses the route near the B9000 junction and there may be others	• Information noted in Section 6.4.10
Aberdeenshire Council (Transportation and Infrastructure)	7.12.05	Ewan Wallace/Mark Peters	• Stated that the EIA should consider the implications of the Land Reform (Scotland) Act 2003 and the designation of land and access land. Provided map annotated with three areas of woodland subject to woodland grant scheme approval from the Forestry Commission Scotland. Included map with 2 routes within the Fornety Farm Scheme which are claimed rights of way. Noted that the catalogue of Rights of Way is not a comprehensive list of rights of way and other routes may be in use on the ground that are not known to the local authority • The local authority would be obliged to investigate any route which was brought to attention due to obstruction or otherwise. Some of the information relating to the historic built environment is incorrect and needs amendment: Orrock House is a category "A" listed building and therefore the most significant building in the study area not the Mill of Foveran Farmhouse • The late 18th Century gatepiers on the north axis of Orrock House are also included on the statutory list and so afforded protection under the Planning (Listed Buildings and Conservation Areas)(Scotland) Act 1997.The ruined church at Belhelvie is a scheduled monument and not a listed building • The listed building status of Balmedie House, Menie House and the Mill of Foveran Farmhouse shown on the plan is correct. Provided Natural Heritage and Built and Cultural Heritage contacts. • Noted that they can provide traffic data on some of the main roads taking access from the A90, and can check these if given exact locations where traffic data is required from	• Information used in Chapters 6: Land Use and Property and 16: Pedestrians, Cyclists, Equestrians and Community Effects • Baseline updated and information taken into account in relevant chapters • Desk research indicated that Belhelvie Old Parish Church is B-Listed
Aberdeenshire Council (Transportation Manager)	21/02/06	Meeting with Ewan Wallace	• The main travel patterns in the Balmedie area were noted to be the southern exit from Balmedie, the B977 to the west and to a lesser extent the northern access to Balmedie • Designs are currently being developed for TD22 standard junctions at all these locations and also at Balmedie (south). There is also an option of a split junction at either side of Balmedie. Noted that this would be good for public transport, enabling easy access for passing services on the A90 to pick up passengers in Balmedie • Noted that the junction on the A975 is slightly less attractive with the westbound route • Noted that the speed limit of 50mph that is currently in place in Foveran, is planned to be extended with a 20mph zone added at the school that would operate during certain hours • The following information to be provided:	• All information taken account of in the scheme design and the relevant chapters in the ES

Organisation	Date	Name	Information/Contents	Response/Comment
			• Accident data for the last 5 years for the town of Balmedie, the A975 and the B9000; • ATC data for the B977 and if any is available for the town of Balmedie; • Information on trip generation for the employment site in Balmedie; and • Any key community contacts for future consultation	
Aberdeenshire Council Transport and Infrastructure	11/07/06	Peter MacCallum	• Stated that from a sustainable transport perspective that we ensure the scheme options have the best possible walking, cycling & public transport infrastructure	• Noted
			• Noted that he was at the public exhibition & saw that all route options maintain the existing road for local access, which is good as it allows bus services continued access to roadside settlements & the low traffic flows which would result on the existing road from the new dual carriageway would improve the environment for cyclists & perhaps pedestrians - this applies to all route options but some options may be better than others for cyclists & pedestrians as a result of the side road junction layouts	• Noted
			• Added that at the public exhibition he spoke to local residents concerned about walking access along the quiet side roads being severed by the new road corridor • In carrying out the environmental assessment he suggests that it may be worth considering how local residents could walk to nearby properties as this would likely show some options better than others	• Noted and taken into account in Stage 2 options appraisal
Architecture and Design Scotland	21.11.05	Angella Williams	• Commented that Architecture and Design Scotland has the remit including offering expert advice on the quality of design in projects which may; have strategic significance; make potentially major impact on the environment; set new standards for the future; or prove particularly sensitive in design terms • Stated it is not in a position to provide detailed background information of the kind requested, or comment on the merits of a particular route	• Noted
Bear Scotland	02.02.06	Dave Stewart	• Gives details of road maintenance works which have been undertaken recently /planned for this section of road • Balmedie to Hill of Menie: overlay applied to road in 2003 (20 year life design) and some edge strengthening works were incorporated. There is a proposal as part of an existing planning consent for a right turn stacking land to the Cock and Bull inn (currently at design stage) • Hill of Menie to A975 Newburgh junction: maintenance carried out 2003/4 to replace carriageway surface. Lighting installed at Hatterseat junction in 2002 • A975 junction to Foveran village limits: overlay of 100mm carried out in 2002 in response to failing carriageway surface, some edge strengthening undertaken, kerbing installation • Foveran village to Tipperty: Proposals currently in place to progress a carriageway surfacing scheme in 2006 in order to restore pavement integrity • LBAP: BEAR's Landscape Action Plan (LAP) contains details on protected species, sites and LBAPs and shows no occurrence of any along the existing trunk road line between Balmedie and Tipperty. Also have no records of any other natural heritage features of interest	• Information noted and passed to project engineers

Organisation	Date	Name	Information/Contents	Response/Comment
			• There Landscape Action Plan shows no occurrence of cultural heritage interests along the existing trunk road line. As far as geological features of interest, soils, contaminated land none are known along the existing road line • Bear Scotland did not know of any geological features of interest, soils, contaminated land, aquatic features and water supplies or recreational use of the area along the existing road line	• Noted
			• Provided table giving traffic figures which they held, noted however that Transport Scotland hold up to date traffic counts and would be able to supply these on request (provided contact details). • Stated road is main strategic link from Aberdeen to the northern Aberdeenshire area and the Ports of Peterhead and Fraserburgh. As such the stretch of carriageway in question is subject to significant HGV movement and also to high levels of tidal peak hour traffic (southbound a.m. and northbound p.m.)	• Information noted and traffic data accessed (see Chapter 4: Traffic)
			• Bear Scotland mentioned that various utilities plants are in existence on both trunk road verges including fibre optic and electrical cabling, gas and water pipelines. Detailed information on locations could be supplied directly from the Utilities companies concerned	• Information included in baseline and in Section 6.4.10
			• Noted 4 main sections of the road where maintenance works have been progressed along this section of road during recent years: a)Balmedie to Hill of Menie - subject to road maintenance construction works during 2003, when an overlay of between 50mm and 150mm was applied to the existing carriageway section. The design was for 20 year design life, no realignment took place and some edge strengthening works were incorporated in the work • Further noted there is a proposal in place as part of an existing planning consent for a right turn stacking lane to be constructed to the 'Cock and Bull' inn, shown on the plan (this is currently at design stage). b) Hill of Menie to A975 Newburgh junction - maintenance work carried out during late 2003/2004 in order to replace worn carriageway surface, lighting installed at Hatterseat junction in 2002. c) A975 junction to Foveran village limits - overlay of average depth 100mm carried out in 2002 in response to failing carriageway surface • Some edge strengthening undertaken, kerbing installation. d) Foveran village limits to Tipperty - some significant maintenance work in recent years. Proposals are currently in place to progress a carriageway surfacing scheme during 2006 in order to restore pavement integrity	• Information passed to project engineers
British Horse Society (BHS)	10.11.06	Pat Somerville	• Nothing to say specifically about proposed options and route as existing road so busy can't use it • Any existing tracks should be retained if possible • High sided parapets necessary on narrow bridges but if two lanes can go in the middle and don't need to be so high • Important to have solid bottom of parapet so if a horse fell can't get leg stuck • Only registered stables she has is Mains of Foveran at Newburgh • Others should be registered/licensed through Council	• Information passed to project engineers • Benefits to horse riders of proposals noted in the ES

Organisation	Date	Name	Information/Contents	Response/Comment
East Aberdeenshire Golf Club	13.03.07	J. Allan Stewart	• Road works will be carried out directly across the access to the golf course and there is concern that this will temporarily stop members having access to facilities that are paid for, and represent a considerable body-blow to the reputation of the golf club • There will be a temporary loss of the practise putting, practise chipping area and driving range • Request that works will not require the club to desist, even temporarily from using the 18th green of the course	• Information noted and effects on the golf club appraised in Chapter 6: Land Use and Chapter 16: Pedestrians, Cyclists, Equestrians and Community Effects
Forestry Commission Scotland	6.1.06	Alan Harper, Grampian Conservancy	• Enclosed an annotated map showing the reference number and scheme name of the grant aided forestry schemes • Noted that there are 6 in total although mentioned that the Forestry Commission would hope that Oldmill Croft just north of Foveran will not be affected. Stated that Oldmill Croft has been designed to give the owners shelter and privacy behind their house and if any of this ground was lost from the western edge, they would be disproportionately affected • Enclosed maps and copies of the particular contract in individual envelopes for each of the existing schemes with the contact names, addresses and phone numbers if available • Noted details on the 6 schemes which would be affected (Fornety, Oldmill Croft, Aikenshill, Dambrae, Menie House Estate and Millden)	• All information used in Chapter 6: Land Use and Property and Chapter 7: Agriculture, Forestry and Sporting Interests • Landscape Design takes account of potential impact at Oldmill Croft
Grampian Badger Group		Mike Harris	• To be included in 2nd round of consultations	• Grampian Badger Group undertook a protected species survey of the route corridor (see Section 10.5.4)
Health and Safety Executive	12.12.05	Dr Geoff Cook	• Proposed dual carriage crosses two pipelines: 1. BP Forties Cruden Bay to Grangemouth2. Shell NGL St Fergus to St Fergus to Mossmorran HSE advised that the ES should not include measures that conflict with requirements of the Health and Safety at Work etc At 1974	• Information included in Section 6.4.10
	11.07.06	Geoff Cook	• The Consultation Distances for two pipelines affecting the proposed routing are :BP Forties Cruden Bay to Grangemouth - 435 metres & Shell NGL St Fergus to St Fergus to Mossmorran - 485 Metres. No further comment to make	• Information included in Section 6.4.10
Historic Scotland	7.11.05	William Kidd	• Gave details of Historic Scotland's remit in the provision of information and advice for the protection of the built heritage ;For archaeological issues, Historic Scotland's remit extends as far as monuments protected at national level by the Ancient Monuments and Archaeological Areas Act 1979 • Further noted the responsibility for providing information and advice on unscheduled archaeology lies with the relevant council archaeologist, provided name and contact details of the relevant council archaeologist. Recommended seeking detailed information on conservation areas from the Local Planning Authority • There are no scheduled monuments, listed buildings or historic gardens and designed landscapes within the area of search and noted on the map the location of relevant Listed Buildings are marked within the vicinity of this route	• Noted

Organisation	Date	Name	Information/Contents	Response/Comment
			• Drew attention to Orrok/Orrock House, a category A listed building which will be in close proximity to the preferred route of road improvement line • Suggested particular attention is paid to the possible impacts upon the setting of this building by the Preferred Option (1996), Sub-Option 1 and Sub-Option 2. Stated the assessment of setting should involve both visual and oral considerations. Furthermore drew attention to Scheduled Ancient Monument 3277, Hare Cairn, 600m W of Keir (OS 3955, 817651) • Considerations of possible impacts upon the setting of this monument should also be included in the environmental assessment	• Effects on Orrock House and Hare Cairn appraised in the ES (setting and noise)
Historic Scotland	16.05.06	Meeting with Lily Linge	• Purpose of the meeting to discuss options for A90 Balmedie to Tipperty road improvements and the potential impacts of options to resources of historic importance • Final copies of Stage 3 environmental reports provided to copy • Impacts on Orrock House (A listed) and/or Menie House and Estate (B listed). Historic Scotland to confirm in writing but likely that impact to Orrock given higher priority • Historic Scotland would be happy with any option which had no more impact on Orrock House than the route agreed in 1996 • Historic Scotland designed landscape team has confirmed that the Menie House landscape is of no particular importance (not on the Inventory or likely to be) and does not need to be a key criterion in the decision make • In considering the impacts to the two listed properties there will be a balance between the setting of Orrock House and the severance of the Lodge (not listed) from the House at Menie although within its curtilage. As long as the Lodge is not lost there would not necessarily be an objection from Historic Scotland. Mitigation would be important (e.g. avenue planting etc).	• All information taken into account in the scheme design and relevant chapters of the ES

Historic Scotland	01.12.06	Lily Linge	• Changes from Stage 2 were outlined. These included:
			  • Movement of the B977 link road to closer to Hare Cairn to better fit the landscape;
			  • Movement of the route at Orrock House to the west side of the hillock to better fit the landscape;
			  • Movement of the A975 junction north to reduce the impacts on the properties Aikenshill and Kirkhill
			• Potential impacts from the scheme on the cultural heritage interests were outlined. These included:
			  • Impact on the setting of Orrock House – the route will be in slight cutting and lined with dry stone walls and hedges. The route passes closer to Orrock House than previously
			  • Impact on the setting of Mill of Foveran - the route will be in cutting and there is proposed planting in a field in front of the property
			  • Hare Cairn SAM – the B977 link road has been moved closer to the SAM and this may have an impact on the setting. The road has been moved to best fit the landscape and will be mitigated with hedgerow planting. Kirkdale outlined that they were carrying out an assessment of noise changes to the setting of the SAM in liaison with WSP
			  • Unknown burial sites around the area of the B977 link road – HS does not weigh this site very heavily
			• Draft assessment of the potential impacts, proposed mitigation and updated archaeological
				• All information taken account of in the relevant chapters in the ES

Organisation	Date	Name	Information/Contents	Response/Comment
			gazetteer to be sent to HS for review • HS indicated that where an archaeological interest was to be lost due to the development then • geophysical surveying was not usually done	
Land Owners and Land Managers	September 2005-February 2006	All relevant	• Communications and meetings ongoing throughout development of proposals (most by project engineers but with some input from environmental team)	• Issues taken into account in development of scheme and mitigation
NESBREC	02.12.05	Nick Littlewood	• A database search was carried out to a distance of 250m either side of the route corridor. This search did not reveal any statutory or non-statutory designations affecting the area. Described that some habitat and species data were identified by the search including comprehensive Phase 1 habitat survey for the southern part of the route • Presented the information that resulted from the database search at 250m either side of the route corridor from seven different "views" running from north to south. Data provided phase 1 habitat information on protected and priority species, general habitat and tree species for the proposed route	• Information used in appraisal presented in Chapter 10: Ecology and Nature Conservation
	14.06.06	Nick Littlewood	• Nothing more to add to last consultation response, do contact if any additional information is required	-
NE Scotland LBAP Officer	20.2.06	Justin Prigmore	• Noted that it was not within the remit of the LBAP officer's post to consult on planning applications, but will help regarding LBAP Priorities to consider within the EIA • Provided a full list of LBAP priority species and habitats for the North East that should be considered. Noted the LBAP is an evolving document and that just because a plan has yet to be developed does not mean that the particular habitat or species is any less of a priority • Also noted that they have adapted the policy of concentrating efforts on habitats, with the aim of incorporating priority species within these. Directed towards all published LBAP's are available online at www.nesbrec.org.uk • Noted that they do not hold distribution data for LBAP Priority Species or Habitats, and that all the available information is available through the North East Biological Records Centre (NESBReC)	• Noted and information taken into account in EIA
NESTRANS	n/a	Peter Cockhead	• Aberdeenshire Council will cover any information which they could provide	• Noted
RSPB	21.11.06	Rebecca Graham	• RSPB do not have any further ornithological information for the area under consideration. • RSPB recommend that an up to date breeding bird survey, or adequate desk study (possibly combination) should be carried out along the final route and junctions, to assess if there are likely to be any negative affects on specially protected birds. Noted this would include species in the European Annex 1 list, British Schedule 1 list and British Birds of Conservation Concern Red and Amber lists • Stated that the Scottish Ornithologists Club (Aberdeen Branch) have carried out fieldwork during	• Noted • Breeding bird survey undertaken (see appendix 10.2) • SOC contacted (see below)

Organisation	Date	Name	Information/Contents	Response/Comment
			2002 to 2005 for a new N-E Scotland Breeding Bird Atlas (at the 2x2 km scale). They may therefore hold relevant data for all or part of the route, and are planning further survey in 2006 and included SOC contact details	
	10/07/06	Rebecca Graham	• No further info to add to their comments from last year	
Scottish Ornithologist Club	5.12.05 and 6.12.05	John Wills	• The club is involved in a five-year programme of data collection for a new breeding bird atlas for North East Scotland. Couldn't positively state that data has been collected over the area of the proposed A90 dualling but it is quite likely • Information from the Atlas Data Coordinator: the club has 13 relevant tetrads (2 x 2 sq.km) with data – 6 on the route and 7 within 500m of the route shown. Within these tetrads there are 503 records of either: present in suitable habitat for breeding, possible breeding, probable breeding and proven breeding. If any further data is required then a request of donation for the publishing fund for the breeding bird Atlas is required	• Bird survey undertaken to inform EIA (see Appendix 10.2)
	31/07/06	John Willis	• No further comments to those made to Natural Capital on 06 Dec 05	
			• SOC have more data on breeding birds which supersedes the info he provided in Dec and Jon Hardie's work - we can buy this data in the form of the NE Scotland Atlas project from SOC Grampian for £100	
Scottish Water	20.2.05	Graham Morris, Developer Services	• A review of Scottish Water's records indicates that there are Scottish Water water/waste water assets in the area that may be affected by the proposed development • Noted it is therefore essential that these assets are protected from the risk of contamination and damage and that this also applies to water courses that feed into reservoirs • Provided a list of precautions that Scottish Water would ask to be taken to ensure their assets are not affected. List covered topics such as the need for a detailed method statement and risk assessment, methods to reduce any pollution to water features, access to Scottish Waters assets, construction precautions etc	• Information passed to project engineers • Measures would be implemented to protect utilities and water presented in Annex B: Collated Mitigation
Scottish Wildlife Trust	2.02.06	Mike Stevens/Lisa Rigby	• The proposal is not likely to directly impact a SWT reserve and therefore SWT do not have any comments	• Noted
Scotways	28.10.05	Jo Doake	• The National Catalogue of Rights of Way does not show any rights of way in the vicinity although there may be local footpaths. However, the records are incomplete so there could be other routes there that meet the necessary conditions to be a right of way, but have never been recorded	• Noted

Organisation	Date	Name	Information/Contents	Response/Comment
SEERAD	09.11.05	Mike Neely	• Referred to an original response sent to Turnbull Jeffery Partnership on the Stage 3 Assessment on 10 May 1996 and noted this response should still be available. Confirmed the comments in that letter would still apply and that this department would not consider either land use or farm viability comprising an issue • Sent a copy of the original letter on 13.12.05 Noted since 1996 there will have been some changes in the occupiers of land along the line of the routes proposed, SEERAD have not had the opportunity to carry out any checks on the ground but in terms of the main agricultural occupiers these changes are not though to be significant • 1996 Letter: Agree with findings of Stage 2 assessment. Amount of prime agricultural land affected by the then preferred route not considered an issue. Includes comments on the likely impact on 8 land holdings in the area and possible mitigation measures. Mill of Foveran will be seriously affected though severance	• Noted • Effects on Mill of Foveran are appraised in Chapter 7: Agriculture, Forestry and Sporting Interests
SEPA	21.11.05	Mike Duckett (In future contact Aberdeen)	• Suggested contacting SNH for information on any natural heritage designations, protected species and important habitats and species • Additionally recommended contacting the North East Scotland Local Biodiversity Action Plan Officer for information on the LBAP. For information on contaminated land SEPA recommend contacting the Contaminated Land Officer within the Local Authority. If more detail on river flows in the general area is required then SEPA's nearest gauging stations are on the Ythan at Ellon and the Don at Parkhill (near Dyce) • Stated if data on these gauging stations is required then contact SEPA with the timescale of interest and a local hydrologist will be asked to provide the information • Provided map showing two water resource pressures (both surface water abstractions) in the area and noted that there may be additional private water supplies for which SEPA currently hold no details, and that these may be available from the relevant Local Authority • Provided a map of water bodies in the area of the A90 between Balmedie and Newburgh, with an accompanying table detailing the pressures on the water bodies that cross the A90	• Suggested contacts followed up • Information included in Section 9.5
			• Attached a spreadsheet listing the consents within the area A90 Balmedie-Tipperty Road. Also attached an extra worksheet called 'Menie Burn' which lists the consents within this area but might be a little outside the search area • Recommended contacting the local authority with regards to traffic use in the area and site infrastructure such as water mains, gas pipelines etc • Commented that while this response to a request for environmental information has been handled through Environmental Information (Scotland) Regulations 2004, consultations relating to screening and scoping of the ES and the application accompanied by Environmental Statement should all be directed to SEPA's planning function at Aberdeen (provided Aberdeen office address)	• Aberdeenshire Council contacted • Noted

Organisation	Date	Name	Information/Contents	Response/Comment
SNH	20.12.05	Vivienne Gray	• **Protected Sites:** Enclosed map of nearby designated sites. Noted the site is approximately 3km inland of the following sites; Sands of Forvie and Ythan Estuary Site of Special Scientific Interest (SSSI), Foveran Links SSSI and Ythan Estuary, Sands of Forvie and Meikle Loch Ramsar Site, Special Area of Conservation (SAC) and Special Protection Area (SPA).Sands of Forvie, Ythan Estuary and Meikle Loch are classified for a number of features including their internationally significant populations of overwintering and breeding waterfowl • Interest at Forvie Links includes geomorphological features such as active dune systems as well as the range of migrant birds, and for the large moulting and passage flocks of seaduck and divers that occur offshore. Includes further information on these sites • **The Foveran Burn** that runs beneath the road at grid reference NJ972239 runs into them and the SSSI and SPA designated area extends part of the way up this tributary. As the road is following a new alignment, there will be a requirement to construct a crossing at this point • During bridge construction there is a possibility that pollutants could enter the watercourse, resulting in detrimental impact on bird species and possibly otters. SNH therefore recommend that potential impacts and mitigation of such an occurrence should be addressed in the EIA. Noted further information on pollution and statutory requirements for avoiding such events is available from SEPA • SNH notes that Chapter 5, Section 5.4.14 of Volume 1 of the 1996 Environmental Statement states: *Conditions of Contract will be written to include for the direct protection of the Foveran and Tarty Burns and consequently, the indirect protection of the designated coastal and esturine sites, both during and after construction.* SNH recommend these conditions be revisited to assess their applicability to the current scheme. SNH can provide further comments on these • **Protected Species:** Although SNH does not have specific information on this location, otters are known to occur throughout Aberdeenshire and SNH therefore recommend that an otter survey be carried out at appropriate points to be agreed by SNH • Noted that, although unclear from the map, if the proposal were to affect buildings and/or bridges, bats and their roost sites may be affected. Therefore SNH recommend for any structures where this may be the case a bat survey should be undertaken. SNH can provide details of bat surveyors if necessary Enclosed a brief guidance note on European Protected Species (EPS) • In addition to baseline survey for EPS, the EIA should propose mitigation measures to reduce adverse impacts. SNH does not have specific information in relation to badgers within the area of proposed works, but understand that badgers are present throughout this area. Therefore recommend that a badger survey be carried out as part of the EIA process. SNH directed to Mike Harris of Grampian Badger surveys for further information. In addition to baseline survey for badgers the EIA should propose mitigation measures to reduce adverse impacts • **Woodland:** At several points along the road corridor there are areas of woodland that are shown on the Scottish Native Woodland Inventory as being of semi-natural broadleaf composition. As this type of woodland is relatively rare within this part of Grampian, SNH recommends that the working corridor be designed to exclude these areas from possible impacts • SNH also stated the road realignment presents an opportunity to create new plantings at strategic locations, which could assist in screening the road from surrounding settlements • **Raised Bog:** SNH holds an inventory of raised bogs, which shows a site at grid reference NJ980258 that is within 500m of the existing road. Although it is unlikely that construction works	• All information used and taken into account in Chapter 10: Ecology and Nature Conservation • Preliminary bat survey undertaken (see Section 10.5.4) • Mike Harris undertook protected species survey (see Section 10.5.4) • Preferred scheme avoids key woodlands in the area

Organisation	Date	Name	Information/Contents	Response/Comment
			would directly impact this site, there is a possibility that resulting changes to the land cover and drainage at this part of the road could affect the hydrological regime of this bog • SNH therefore recommend that the potential impacts of the road developments on the bog and any associated lagg fen should be assessed as part of the EIA process • **Landscape:** SNH's Landscape Character Assessment (LCA) for this part of Aberdeenshire identifies the area as Agricultural Heartlands and some Coastal Strip to the North of Balmedie. • Moving in a northerly direction there is a progression from a reasonably enclosed landscape around Balmedie with gently rolling hills and remnant woodlands to a more open, intensively farmed plain past Rashiereive • Chapter 5, Section 5.4.14 of Volume 1 of the 1996 Environmental Statement includes the following: *Landscape Design proposals for the Scheme will maintain and enhance, rather than reduce, the potential ecological value of the study area and will, therefore, provide long-term benefits.* Design and mitigation of the proposal should take account of the changing landscape character of the route. Design proposals and mitigation measures were agreed in the previous assessment of this proposal, SNH attached these for information • **Geology:** SNH recommend that the potential need to excavate and store rock should be incorporated into the EIA. Further information on geological and geomorphological interests is available from British Geological Survey (BGS) and the Macauley Land Use Research Institute (MLURI) • As the works will involve excavations, there will be a need to store soil during works. The EIA should include an assessment of the means of storage and redistribution, particularly in relation to possible contamination of watercourses	• See Landscape Design strategy in Appendix 11.2 • Preferred route distant from site. Would not be affected • Landscape advice used in Chapter 11: Landscape and Visual Effects • Noted (see Chapter 9: Geology and Soils) • See above and Chapter 9: Road Drainage and the Water Environment

Organisation	Date	Name	Information/Contents	Response/Comment
	8.3.06		• Ythan estuary is particularly sensitive to nitrates, as high levels have led to eutrophication and the growth of weed mats (*Enteromorpha* species), which pose a potential threat to invertebrates living within the estuary and the bird life that relies upon them. • The proposal could have an impact if excess sediment is mobilised and washed into the estuary, increasing the nitrate levels. The proposal could have adverse impact on the features of the SPA through the release of pollution, in particular sediment, to watercourses. This is most likely during the construction phase, although it is possible that increased inputs will continue following completion. SNH therefore recommends that the Environmental Impact Assessment incorporates sufficient information for the Scottish Executive, as competent authority, to carry out an appropriate assessment in accord with the Conservation Regulations. Stated this assessment should consider the potential impacts on SPA features of interest and proposals for mitigation. • As per previous advice SNH recommend that an otter survey is carried out to an appropriate distance from the development, to be agreed by all interested parties. • SNH noted that proposals for undertaking ecological surveys do not include bat surveys and recommend that if these have been scoped out of the EIA process, justification this is included in the reports. • Noted if this is not the case then SNH reiterates the previous advice that surveys should be carried out in consultation with SNH. Stated that based on SNH's current information they consider the most likely impact to bats could arise if the existing carriageway is to be removed following completion of the new. This could affect bats where bridges are removed as these are known to be favoured as roost sites by Daubenton's bats. • Pointed out (from Annex A), the Scottish Executive (SE) may be required to issue a licence for the proposed road works where these may unavoidably impact upon EPS. • Added SNH can advise further once surveys are complete and project design has been confirmed. • Noted where activities in close proximity to setts are unavoidable, there is provision for some of these activities to be carried out under licence (SNH is the licensing authority), and that SNH can advise further depending upon the outcome of any survey. • SNH welcome the proposal to include a survey for water voles and recommend that it be conducted to a distance of 200m from the development boundary. • SNH has no further information on habitats along this corridor and therefore welcomes the proposed extended Phase 1 habitat survey.	• Information used in appraisal of effects on the Ythan (see Chapters 9: Road Drainage and the Water Environment and 10: Ecology and Nature Conservation) • See Section 10.5.4 • Bat survey undertaken (see Section 10.5.4) • The existing carriageway would not be removed • SNH advice on surveys sought and implemented • Noted and implemented
	04.05.06	Vivienne Gray	• SNH has previously advised Natural Capital on the entire scheme and so has only commented on the **ground investigation phase** • The development lies approximately 3km inland from: o Sands of Forvie and Ythan Estuary SSSI o Foveran Links SSSI o Ythan Estuary, Sands of Forvie and Meikle Loch Ramsar Site, Special Area of Conservation (SAC) and Special Protection Area (SPA) • SNH considers it unlikely that the proposal will have a significant effects on any qualifying interests either directly or indirectly and therefore an appropriate assessment is not required • To ensure no detrimental effects occur, SNH recommend that a method statement detailing the works and any mitigation measures should be agreed with SNH and any other interested parties	• Information noted and SNH commented on method statement for ground investigation works

Organisation	Date	Name	Information/Contents	Response/Comment
			• Otters could be present in the watercourses that will be affected by the proposal and SNH recommends that an otter survey is carried out to an appropriate distance from the proposed GI sites, to be agreed by all interested parties • A bat survey should be undertaken where the proposal will affect buildings or bridges although this will not be required in the case of the GI • Note that two GI sites are within 500m from setts identified in a drawing provided to SNH by Natural Capital on 23.02.06. It is unlikely that the proposed works would have a direct impact upon these setts and licensing in relation to these setts only is unlikely to be required. A badger survey should be carried out by a suitably qualified surveyor and this should cover those areas of the site that are likely to host badgers and/or their setts. • Where GI works are to take place within 200m of a watercourse SNH recommends that a walkover survey for watervole are carried out (can be in conjunction with that for otters) • Volume 11, Section 4 of the DMRB on Environmental Design and Management includes advice on surveying for species identified above. This advice should be followed. • Where the current preferred option coincides with proposals considered in the previous EIA of 1995/1996, SNH recommends that reference is made to this data	• Protected species survey undertaken for GI
SNH	25.05.06	Fiona Cruickshank/Fiona Mutch Mike Harris	• Purpose of the meeting was to discuss the approach to the protected species survey in relation to ground investigation survey; options for the A90 Balmedie to Tipperty road improvements and the EIA of the preferred route • The proposed approach to survey and mitigation measures were described and agreed with SNH • Historical records of protected species to be checked • Mitigation to be defined for all locations where evidence of protected species found. Mitigation (including need for licences) to be discussed with SNH at appropriate time • SNH commented all watercourses should be checked for water vole • In relation to potential impacts to Ythan Estuary contractor to draw up method statement GI works for comment by SNH prior to starting any works on site to show how potential pollution risks will be controlled and what protection methods will be put in place • A bat survey should be carried out of any existing structures to be affected by the construction works and of all mature trees which may require felling • SNH considered the ES should include anecdotal bird survey notes and also the findings of a more formal survey to provide information on breeding birds in the area of the scheme.	• All information taken into account in the relevant chapters of the ES
	27.6.06	Vivienne Gray	• Offered comments for consideration during the bird survey: • The number of plots appears to be sufficient for the purpose although SNH have asked for further information on spacing of transects within the plots and the frequency of visits to each. • Pointed out that to achieve a representative sample the Breeding Bird Survey methodology recommends 3 visits as follows: first visit March – April to set up route and record habitats, second visit between April – mid – May for an early transect count and final visit mid-May – let-June for a late transect count • SNH stated that although fieldwork can generally begin later in more northerly parts of the country, as the survey started the week of 19.6.06 it is likely that it will have missed species which should be included in the EIA of the scheme.	• Bird survey undertaken (see Appendix 10.2)

Organisation	Date	Name	Information/Contents	Response/Comment
			• Therefore subject to the outcome of the current survey, SNH recommend that additional visits should be made as per the above guidance between April and late May 2007 • SNH stated that if it is not possible to include these additional visits, a suitably precautionary approach to the development that included mitigation may be an acceptable alternative. However, as this approach would involve unknown factors including details on species, abundance and distribution, SNH would expect to see a greater level of mitigation than may otherwise be necessary. Mitigation should include information on habitats along the road corridor and their likely suitability for birds	• Found not to be required (see Appendix 10.2)
	7.7.06	Vivienne Gray	• Noted that the report sent through seemed thorough and the recommendations seemed appropriate. • Stated that the consultation letter has been passed to SNH Landscape Advisor.	-
	25.7.06	Vivienne Gray	**Ecology and Nature Conservation:** • Stated the four sub-options could each have an effect on notified features of the Ythan Estuary, Sands of Forvie and Meikle Loch Ramsar Site, Special Area of Conservation (SAC) and Special Protection Area (SPA). AN SNH's opinion, the surveys previously requested by SNH should identify the nature and extent of any potential impacts and SNH will be in a position to offer further advice on these effects, the requirement for an appropriate assessment, and mitigation measures on receipt of survey results. **Landscape Character:** • The landscape of this area is described in SNH's Landscape Character Assessment (LCA)as *Agricultural Heartlands* and specifically as the *Formantine Lowlands*. Provided a synopsis of the LCA. • The complete or potential loss of the landscape characteristics as set out in the LCA, from the development of this proposal, is likely to increase the overall significance of the impacts. In addition, this could cause a steady decline in the quality and condition of landscape character in this area. **Visual Character:** • Noted there is a relatively strong visual relationship between the land to the east and the west. The more undulating landscape to the west, forms an immediate visual horizon in views from within the broader and more open coastal landscape to the east. As such, the introduction of development within this zone of intervisibility is likely to create visual impacts for residents and travellers along the local network of roads. Broadly speaking where the vertical and horizontal route alignment reflect more readily the underlying landform and minimise the requirement for removal of landscape features, the visual impacts of the new road and significance of those landscape changes could be reduced. • Included table containing further info on landscape effects and visual effects for each sub option • Provided European Protected Species - Legal Position and a summary of SNH advice from 1.12.05	• SNH consulted and findings discussed • Information taken into account in appraisal of landscape effects in Chapter 11: Landscape and Visual Effects

ANNEX B

COLLATED MITIGATION

General Mitigation

GEN1. Where final scheme details could vary from those described in the ES, the terms of the contract would ensure that the resulting effects were no greater than those reported in the ES. If there were significant differences in the predicted effects of the scheme an addendum to the ES would have to be published for public consultation and comment and consideration by Transport Scotland and Scottish Ministers.

GEN2. Consultations and discussions with key stakeholders would continue through the contract.

GEN3. The contractor would be required to obtain all necessary permissions and consents for use of land outwith the land made available for the contract.

GEN4. The contractor would be required to securely fence off the area of the works in advance of construction in order to protect public safety and ensure that there is no unauthorised public access to the site.

GEN5. The contractor would be required to manage traffic on the A90 and on local roads safely and efficiently through the works to ensure the risk of delay and inconvenience was reduced to the minimum necessary for the works.

GEN6. Temporary signs would be employed during the life of the contract to warn drivers in advance about the presence of any queues and anticipated delays.

GEN7. Working hours would be agreed with Aberdeenshire Council and set out in the contract. At present they are assumed to be 08.00 to 19.00 Monday to Friday and 08.00 to 13.00 on Saturday. All night time and Sunday working would be agreed in advance with Aberdeenshire Council.

GEN8. Noise limits for construction would be agreed with Aberdeenshire Council and set out in the contract.

GEN9. Access to all properties would be maintained during construction and operation of the scheme.

GEN10. The contractor would be required to maintain effective liaison with local communities close to the construction area. This would include circulation of information about ongoing activities and a contact telephone number for use by the local community to contact the contractor for information. The telephone would be operated during operational hours and person(s) with appropriate authority to resolve any problems that occur would be available. A log of all complaints and actions taken would be kept and made available for inspection.

GEN11. The contractor would be required to produce and implement an Environmental Management System (EMS) for the construction and maintenance period.

GEN12. Compliance with the EMS would be audited at regular intervals by Transport Scotland's representative on site.

GEN13. The scheme drainage would include appropriate sustainable urban drainage system measures.

GEN14. Ledges to allow animal passage would be included in culverts.

GEN15. Vertical concrete barriers would not be used in the works.

GEN16. Use of hexagonal reinforced earth and gabion baskets in the works would not be permitted.

GEN17. Redundant sections of road would be restored to agriculture or the surrounding land use unless the land owner requested the areas to be left for another purpose.

GEN18. The new road and associated works would only be lit where essential to comply with current safety standards.

Land Use and Property

LU1. All redundant areas of road following construction of the new road would be grubbed up unless consultation with the landowner identifies these should be left for other purposes.

LU2. The accesses to South Folds would be designed to reinstate suitable garden boundaries where these are affected. A detailed design study would be developed in consultation with the affected landowners.

LU3. To minimise the impact on No.6 The Holdings, the road cutting would be formed as a retaining wall, which would be continued up to form a new garden wall with some noise reducing value. Detailed mitigation would be agreed with the landowner.

LU4. Mitigation for the loss of the driving range would be agreed with East Aberdeenshire Golf Club if the proposals are consented.

LU5. Access to all properties would be maintained through provision of underpasses or bridges over the new road where required and by provision of new links.

LU6. Compensation would be provided to the landowner for the two ponds lost at Dambrae.

LU7. A new footpath would be provided between Balmedie and Drumhead via the Keir underpass.

LU8. Footways would be provided linking the Holdings and Millden to Balmedie via the Balmedie Junction (see Figure 6.1a).

LU9. The footpath linking the southern entrance to Balmedie with the housing estate to the east would be reinstated where it is affected by the works on Old Road.

LU10. The steps from Balmedie up to the carriageway opposite the Holdings would be closed up to discourage pedestrians crossing at this point.

LU11. All residents and businesses in proximity to the works would be informed about the details of the final proposals and the construction timetable in advance of construction beginning.

LU12. The land take for the proposals would be kept to the minimum necessary for safe construction and mitigation of the works, particularly where in Prime Agricultural Land.

LU13. All utilities which would be affected by construction would be protected to ensure that the supplies of water, electricity, telephone etc to properties would be maintained. If any short interruptions were required to join in new connections to the site affected parties would be notified in advance.

LU14. All pipelines would be protected during construction from any potentially damaging activities.

LU15. Any field drains affected by construction would be reinstated.

Agriculture, Forestry and Sporting Interests

AG1. Permanent loss of agricultural land and forestry would be reduced through route selection, construction programming and planning and re-instatement post construction

AG2. Access to agricultural land and woodland would be provided at all times during the construction process and post construction. Where appropriate and justified, agricultural overbridges and underpasses would be incorporated into the road design

AG3. Damage to the agricultural capability of soils would be avoided by the adoption of appropriate measures during construction and reinstatement

AG4. Existing field and forestry drainage systems would be re-instated to ensure that land capability is maintained and flooding would not be exacerbated

AG5. Financial compensation would be provided for the loss of agricultural land, forestry or land with sporting interests, as agreed with the District Valuer

AG6. Notice of intention to commence construction work would be given to the owners and occupiers of all land along the route before entry is made to such land. Consultation with the landowners and occupiers would allow agreement to a programme of works that minimises disturbance. Any work would be carried out in accordance with the agreed programme as far as is practically possible

AG7. Preparation of a schedule of condition for agricultural land (including drainage), forestry, roads and paths likely to be affected by the proposed development. This would be made available to the owner or occupier and would ensure that land, roads and paths are restored to the reasonable satisfaction of the landowner or occupier

AG8. Agriculture, forestry and sporting roads and paths would be re-instated to a condition equivalent to that subsisting before the commencement of any works

AG9. Agricultural land would be re-instated to a condition as near as is reasonably practicable to that subsisting before the commencement of the works. Topsoil where disturbed would be left in a loose friable condition and where agreed appropriate cover would be replaced. Re-grading where appropriate would be undertaken and land returned to agriculture

AG10. Where ancillary apparatus and material is sited on agricultural land it would be done so with agreement of the land owner/occupier

AG11. There would be provision of temporary fences, lights and guards in appropriate locations for the protection of the health and safety of the public and animals and to avoid trespass. Where appropriate, fencing of the working area to a standard adequate for the purpose of excluding any stock kept on adjoining land would be undertaken. All temporary fencing would be maintained in position during constructional work and thereafter unless otherwise agreed with the occupier

AG12. Where boundary features such as fences, walls and hedges have to be removed to allow construction these would be reinstated with appropriate materials in each case to provide a secure field boundary

AG13. Precautions relating to the exclusion of stock would be combined with due care and attention by construction staff to prevent the straying of livestock

AG14. Where access would require to be altered either temporarily or permanently as a result of construction, alternative access for stock and machinery would be provided as appropriate in consultation with the land owner/occupier. Recessed access would be provided off main and side roads as appropriate with loading/unloading area if required

AG15. All reasonable precautions would be taken during construction to avoid as far as is possible, the spreading of soil borne pests and diseases, and animal and crop diseases. Precautions as recommended by the Scottish Executive Environment and Rural Affairs Department would be observed

AG16. Where an increased livestock disease risk is identified, reasonable claims in respect of injurious affection or disturbance would be payable.

AG17. Careful excavation, storage and replacement of topsoil and subsoil would avoid damage to soils and soil structure and to protect the agricultural capability. Soil bunds would not exceed 1.5m in height

AG18. Particular care would be taken to minimise damage or disturbance to field drains. Laying of new drains would be undertaken as required to keep the affected and adjoining land in good order. Repairing and reinstatement of field drains would be agreed with the land owner/occupier. Where appropriate the integrity of the drainage system would be secured in advance through the installation of header drains (cut off drains) to facilitate construction. All remaining remedial and new drainage works to be undertaken post construction

AG19. Water supplies for livestock would be protected at all times and alternative supplies would be provided where access would be compromised by any works

AG20. An assessment would be made of the risk of windthrow from any proposed felling and management measures defined for each section of woodland. These would include felling to windfirm edges, topping, pollarding and coppicing

AG21. All felling to create a windfirm edge would take account of ecological landscape and visual effects and designed to maximise where possible ecological, landscape/visual opportunities

AG22. Where there are no windthrow or landscape visual issues, tree felling would be minimised to that necessary to allow the safe construction and operation of the road

AG23. Soil disturbance and compaction from harvesting and extraction would be minimised

AG24. Reasonable claims in respect of damage to agricultural land or sporting rights, injurious affection and disturbance would be payable, as would professional charges

Geology and Soils

G1. The contractor would be required to implement best practice measures to ensure disturbance to local geology and soils is reduced to the minimum necessary for the safe implementation of the works.

G2. Opportunities to create rock cuts of geological interest would be exploited where appropriate.

G3. Large glacial boulders uncovered by the works which were considered by the client environmental representative to be suitable for inclusion in landscaping works would be safeguarded and used.

G4. Scheme drainage measures would be designed to avoid erosion of any new or existing rock exposures and to avoid significant disturbance of local drainage patterns.

G5. All soils disturbed by the works would be handled, stored and re-spread following best practice to minimise adverse effects upon soil quality.

G6. The contractor would be required to produce a method statement identifying how best practice would be implemented to ensure soils were safeguarded.

G7. All fuel and other chemicals would be stored in accordance with best management practice within the site compounds. All oil and fuel storage facilities and small static plant would be well managed to minimise the risks of leaks to soil and groundwater.

G8. Plant and vehicles used for the construction works would be maintained on impermeable surfaces to contain oil spills.

G9. All earth bunds and soil storage areas would be well managed to minimise run-off and erosion.

G10. Soils removed as part of the earthworks to facilitate construction would be re-used in the final landforming of the road unless found to be unsuitable.

G11. Any contaminated ground that is encountered would be dealt with according to best practice and contained in the works or disposed of following best practice to a suitably licensed disposal facility.

Road Drainage and the Water Environment

Dr1 The contractor would be required to design the detailed drainage system in accordance with the DMRB, SEPA[1], CIRIA[2] and other best practice guidance and to meet all requirements of CAR.

Dr2 All detailed drainage proposals would be discussed and agreed with SEPA. Method statements for works in proximity to or on burns draining to the Ythan would also be discussed with SNH because of the importance of the estuary as a site designated for its European importance.

Dr3 The detailed drainage design would ensure that there is not an increased risk of flooding of areas in proximity to the works as a result of the scheme.

Dr4 All pipes, basins or filter drains would be isolated from existing surface and groundwaters using impermeable membranes in any locations where land is found to be contaminated.

Dr5 The detailed design would include appropriate SUDS measures including filter drains, detention ponds and swales (see Section 9.8.1).

Dr6 All detailed drainage measures would be designed to benefit nature conservation where this is practical and feasible taking account of the future maintenance requirements. The contractor would be required to follow best practice guidance.

Dr7 All existing crossed watercourses would be culverted or bridged at their current location to maintain the existing flow path. Culverts would be

[1] Current list of relevant guidance available at: SEPA website www.sepa.org.uk
[2] CIRIA, Control of Water Pollution from Linear Construction Projects, Technical guidance (C648)

provided under the road at each location and would be of adequate size for predicted flows and to minimise the risk of blockage.

Dr8 All surface water drainage from the new road works would pass though detention ponds before being discharged to watercourses (providing balancing and pollution benefits).

Dr9 Appropriate mitigation if necessary would be taken forward with the landowner to mitigate for the potential loss of the borehole at Pitmillan.

Dr10 Toolbox talks would be given to all site operatives about the importance of safeguarding water quality and in particular the quality of water discharging to the Ythan.

Dr11 The contractor would be required to identify and implement measures to prevent any sediment rich or polluted run-off or contaminated groundwater produced by the works, entering and polluting the local drainage system and water courses, and to adopt all specific measures identified in the contract requirements.

Dr12 The contractor would be required to develop contingency plans, emergency procedures and joint response plans which would be implemented in the case of accidental spillages during construction. These would be developed in compliance with all best practice guidance and would include a drainage catchment plan detailing the drainage system. This would be made available by the contractor to emergency services to aid in the event of a major spill.

Dr13 Sewage from construction compounds would either pass to a temporary septic tank which would be periodically emptied and removed for off-site disposal at a licensed sewage treatment facility, or would be temporarily connected to an existing sewer.

Dr14 During operation of the road, the maintenance contractors would be required to comply with current SEPA guidance and specifications to avoid the risk of pollution.

Dr15 All SUDS measures would be maintained by Transport Scotland contractors during the life of the road scheme.

Ecology and Nature Conservation

EC1 Habitat loss would be restricted to that required for safe construction of the works.

EC2 New habitats created as part of the landscaping works for the scheme would be designed to enhance the biodiversity of the road corridor.

EC3 New tree planting (other than where specimen tree planting is identified in the Outline Landscape Design) would be with native species typical of the local area, obtained from local sources wherever possible.

EC4 The new ponds created as part of the site drainage would be designed to benefit nature conservation and new planting at their edge would be designed to enhance local biodiversity.

EC5 Culverts would be designed for wildlife in accordance with best practice.

EC6 The site would be checked for the presence of protected species prior to construction work beginning and appropriate mitigation measures would be discussed and agreed with SNH and implemented if any protected species were identified before or during construction.

EC7 The need for a licence[3] would be discussed with the Scottish Executive before construction (because of the potential for otter to cross the site) and if considered necessary a licence would be applied for from the Executive.

EC8 Specific measures to protect otters and badgers (fencing, culverts with ledges and tunnels) have been identified by the protected species expert and these would be included in the contract requirements. The detailed location would be finalised when the final scheme is defined with input from an appropriate expert.

EC9 All tunnels and culverts would be checked regularly when the scheme was operational by Transport Scotland's maintenance contractor to ensure fencing was in good condition and that no culverts or tunnels were blocked.

EC10 A pre-construction survey would be undertaken for protected species by an appropriate expert and if any new activity is identified further mitigation measures would be defined.

EC11 All trees and woodlands in proximity to the works but which do not require to be removed would be fenced off. Only essential tree loss would be permitted.

EC12 Any mature and dead trees would be checked by an appropriate expert for bats prior to removal and appropriate mitigation measures agreed with SNH and implemented if bats were found.

EC13 All woodland, scrub and other habitat would be checked for nesting birds before removal if this is programmed for the bird nesting season. If any are identified appropriate mitigation would be agreed with SNH and implemented. Wherever possible trees would be removed outwith of the breeding period.

EC14 Marginal vegetation from the edge of Dambrae ponds and the Foveran Burn would be used as a seed source for ponds created elsewhere on the site as part of the scheme drainage.

EC15 Any land degraded by construction would be restored after construction was completed.

EC16 Any surface water features[4] affected by the proposals would be made good unless destroyed by construction of the scheme.

EC17 Best site management practices would be implemented on site to minimise the risk of intrusion into adjacent habitats and the risk of pollution incidents which could affect neighbouring habitats.

EC18 Method statements would be drawn up by the contractor and those for activities which could affect the freshwater/marine environment would be agreed with SEPA to ensure all necessary pollution prevention measures were included within them.

EC19 The contractors would follow best practice including the relevant SEPA pollution prevention guidelines (see www.sepa.org.uk).

EC20 Detailed contingency plans would be developed by the contractors for implementation in case of spillage during construction.

EC21 Wooden ramps (or similar) would be placed in any excavations during construction with potential to trap animals to allow easy escape. Open trenches would be checked each day for entrapments.

[3] Where proposals have potential to affect European protected species a licence must be obtained from the Scottish Executive as described in European Protected Species, Development and the Planning System. Interim guidance for Local Authorities in licensing arrangements. October 2002, SEERAD.

[4] Further mitigation relating to water and drainage is contained in Section 9.8

EC22 Surface road run-off from the A90 would pass through sustainable urban drainage systems (SUDS) prior to discharge to a local watercourse.

Landscape and Visual

LV1. Junctions would be designed with the main road passing over the side road to minimise the creation of upstanding landforms in this generally open landscape.

LV2. Wherever practical (taking into account constraints of land-take, planting requirements, etc) embankments and shallow cuttings would be graded out to slopes of 10% or less and returned to agriculture, to minimise the apparent width of the road and thus reduce the landscape impact as well as reducing the overall land lost to agriculture. The locations where this is a specific mitigation commitment are shown on Figures 11.7a-h.

LV3. Cutting and embankment slopes would be rounded off both top and bottom to the largest radius practical and generally shaped to create as naturalistic landform as possible within the constraints of the land made available.

LV4. Bunds and false cuttings would be tapered out at a gradient of not more than 14% along the road line in order to avoid sharp and un-natural transitions between landforms.

LV5. All planting and wildflower seeding would be carried out using plant material of local provenance (the closest provenance that is available in commercial quantities) in order to ensure maximum benefit for local biodiversity.

LV6. All areas of grass within the road corridor not subject to routine mowing (i.e. beyond verges) or returned to agriculture would be sown with a locally appropriate grass/wildflower mix to provide seasonal visual interest and to increase local biodiversity. (except where these would be so narrow as to create practical difficulties during construction or maintenance).

LV7. New woodland planting would consist primarily of locally native species, for functional, visual and biodiversity reasons. Small numbers of non-invasive non-native evergreens may be introduced at the detailed design stage to reinforce the screening value of woodland near houses. Species used would be selected from the following:

Species used in New Woodland Mitigation Planting

Shrubs	
Elder	*Sambucus nigra*
Goat Willow	*Salix caprea*
Grey Willow	*Salix cinerea*
Hawthorn	*Crataegus monogyna*
Hazel	*Corylus avellana*
Privet	*Ligustrum vulgare*
Osier	*Salix viminalis*
Dog-rose agg.	*Rosa canina* agg.
Raspberry	*Rubus idaeus*
Blackthorn	*Prunus spinosa*

Bramble	*Rubus fruticosus* agg.
Honeysuckle	*Lonicera periclymenum*
Trees	
Alder	*Alnus glutinosa*
Ash	*Fraxinus excelsior*
Beech	*Fagus sylvatica (locally common, not native)*
Downy Birch	*Betula pubescens*
Silver Birch	*Betula pendula*
Bird Cherry	*Prunus padus*
Wild Cherry	*Prunus avium*
Wych Elm	*Ulmus glabra*
Holly	*Ilex aquifolium*
Pedunculate Oak	*Quercus robur*
Sessile Oak	*Quercus petraea*
Scots pine	*Pinus sylvestris*
Rowan	*Sorbus aucuparia*
Non-native evergreens or semi-evergreens for screening purposes	
Portuguese laurel	*Prunus lusitanica*

LV8. New hedges would consist primarily of locally native or locally common species, for functional, visual and biodiversity reasons. Species used would be selected from the following:

Species Used in New Hedge Mitigation Planting

Hedge Species	
Beech	*Fagus sylvatica* (locally common, not native)
Hawthorn	*Crataegus monogyna*
Blackthorn	*Prunus spinosa*
Holly	*Ilex aquifolium*
Honeysuckle	*Lonicera periclymenum*
Roses	Rosa spp (native species typical of the area)

LV9. SUDS areas would be planted up with appropriate wetland and marginal species for functional, visual and biodiversity reasons. Areas likely to be regularly wetted or to have damp soils would be seeded with a wetland wildflower and grass mix. Approximately 20% of any shallow permanently wet areas and 30% of damp pond margins would be planted with clumps of locally native species selected from the following:

Species Used in Permanently Wet Areas and Pond Margins

Permanently wet and margins	
Common Reed	*Phragmites australis*
Reed Canary-grass	*Phalaris arundinacea*
Reed sweet-grass	*Glyceria maxima*
Common spike-rush	*Eleocharis palustris*
Floating sweet-grass	*Glyceria fluitans*
Margins only	
Meadowsweet	*Filipendula ulmaria*

Creeping Jenny	*Lysimachia nummularia*
Yellow flag	*Iris pseudacorus*
Marsh marigold	*Caltha palustris*
Brooklime	*Veronica beccabunga*

LV10. Stone would be retained from demolished field boundary walls to be re-used in the construction of new field boundary walls where specified below. As far as practical lichen / moss covered sides of the stone would be used on the outside of the new walls.

LV11. Engineering structures would be faced with materials or with patterns sympathetic to the rural environment. This would include avoiding the use of plain facing to wing-walls, unsympathetic geometric patterns such as hexagonal reinforced earth panels and gabions.

LV12. Construction compounds would be located away from residential areas as far as practical.

LV13. Lighting of compounds and construction areas would be restricted to the minimum necessary for safe working and site security.

LV14. Materials and machinery would be stored tidily during the works. Tall machinery including cranes would not be left in place for longer than required for construction purposes, in order to minimise its impact in views.

LV15. Roads providing access to site compounds and works areas would be maintained free of dust and mud.

LV16. On completion of construction, all remaining construction materials would be removed from the site.

LV17. A small copse would be planted between the Easter Hatton link and the existing A90 opposite Wester Hatton to help reduce visibility of traffic on the side road and a roadside hedge would be planted between the A90 and the side road in order to reduce the risk of headlight intervisibility between the two roads.

LV18. A copse of mixed native woodland would be planted on the northwest side of the SUDS pond adjacent to Easter Hatton, extended into the pond as an area of mixed willow scrub. Smaller copses of mixed willow scrub would be planted on the SW and NE corners of the SUDS pond. All to help integrate the SUDS feature into the landscape and provide habitat benefits.

LV19. The Millden link road across the golf course would be finished in a neat manner appropriate to the style of the golf course. A detailed design study would be carried out in consultation with the affected landowner. The roadsides may be hedged, planted as an avenue, or simply left unfenced.

LV20. The access to the houses at South Folds would be designed to reinstate suitable garden boundaries where these are affected. A detailed design study of the area would be carried out in consultation with the affected householders.

LV21. Woodland would be planted to replace the existing roadside vegetation south of Balmedie Junction removed where the cutting is widened.

LV22. The intersection of cut slopes at the B977 junction would be shaped to create a naturalistic landform.

LV23. Woodland would be planted on and above the large cutting slopes and between the road and the burn, to provide a new feature to help integrate the road into the landscape and to improve screening of the new junction from The Holdings. The woodland would be an

alder/willow dominated wet woodland within about 10m of the burn (dependent on soil conditions).

LV24. Woodland would be planted on the embankment and across the scheme corridor between South Folds and the junction to help screen the new junction from the adjacent houses.

LV25. At the detailed design stage, the possibility of de-culverting the Millden Burn would be considered and implemented if practical. The de-culverting would create a new naturalistic stream course (with pools if possible) to provide visual interest and wildlife habitat value.

LV26. Entrance to Balmedie (Old Road) - slopes would be slackened on the outside of the bend to give a more natural landform, but kept steep on the inside of the bend where necessary to minimise loss of semi-mature conifer woodland. An alignment of trees would be planted on the outside of the bend to provide a semi-formal entrance to the village. These would be a decorative or formal species, possibly *Prunus padus* (bird cherry) or a non-native such as *Malus tschonoskii* (crab apple) or a *Tilia* (lime) variety, to be decided at detailed design stage in consultation with the local authority. Mixed woodland would be planted on the cut slope on the inside of the bend to reduce the impact of the cut into the existing woodland. Existing mixed woodland planting either side of Old Road would be extended southwards.

LV27. Entrance to Balmedie (eastwards), a beech hedge would be planted either side of the road as shown on Figure 11.7a to provide a semi-formal but subsidiary entrance to the village.

LV28. Woodland would be planted on the outside of the southbound slip and around the SUDS pond to provide partial screening of road for planned housing development south of village.

LV29. Works would be carried out to the garden at No 6 The Holdings to compensate for the loss of garden to the junction slip road. The extent and detail of these works would be the subject of a detailed design study in consultation with the affected householder. The road cutting would be formed as a retaining wall to minimise the loss of garden ground, and continued up to form a new garden wall with some noise reducing value. This wall may be extended across the closed-off junction to The Holdings.

LV30. The field boundaries of the B977 link would be new mixed hedges (except as noted below) with standard oak or ash trees (average 1 per 20m, but in irregular groups) to help to help integrate the new road into the local landscape.

LV31. From 0220N to 0535N and along the north side of the local access to The Holdings, the field boundary would be a mortared wall in the style of local drystane dykes.

LV32. Ch0140N to 0550N, new mixed hedge along road boundary to help integrate new road into local landscape.

LV33. Ch0200S to 0300S, old road grubbed up[5] and returned to agriculture (integrated into adjacent field).

LV34. Ch0300S to 0700S, old road grubbed up and area of road and triangle of old field planted as a large block of mixed native, primarily deciduous woodland to create a compensatory landscape feature and habitat, also to screen the new road from users of the old road and from The Bungalow. Linear glades would be left through this woodland

[5] All areas of old road would be grubbed up unless the landowner requested it to be left (see Section 6.6.4)

to accommodate existing services retained on their original alignment.

LV35. Ch0300N to 0520N, clumps of woodland planting to reduce the visual impact of the noise bund and barrier when seen from the Drumhead area.

LV36. Ch0680N to 1900N, road boundary as a mortared stone wall in the style of the local drystane dykes, raised to 1.5m high north of ch1300 to also act as a noise barrier.

LV37. Ch0930N to 1100N, several clumps of mixed woodland on the road embankments to filter views of the road from South Orrock without creating a solid barrier.

LV38. Ch1500 to 1750 (both sides) the cutting through the ridge by Orrock House would be very well rounded off and shaped to appear natural in order to help reduce the landscape impact of the new road on the setting of Orrock House. On the east side the cutting slope would be returned to agriculture, partly to avoid a fence line cutting across the summit of the knoll. On the west side a copse of woodland would be planted to help reinforce the separation between the house and the road.

LV39. Ch 1750N, a small woodland copse would be planted between the diverted house access and the new road to give a stronger visual logic to the road realignment and to help reinforce the separation between Mains of Orrock and the new road.

LV40. Orrock overbridge, north west side and main line ch1920N to 2600N, new mixed hedge along road boundary to help integrate new road into local landscape, also to screen noise barrier where necessary.

LV41. Ch2350S to 2450S, a copse of woodland would be planted immediately alongside the road, to help screen the new road from Hill of Menie Croft.

LV42. Ch2600 to 2710 both sides, copses of mixed woodland to help screen the new road from Seven Acres and Wardhead, to help integrate the road into the landscape, and also to provide a compensatory landscape feature and habitat for the scrub woodland lost adjacent.

LV43. Ch2580 both sides to 2850S and to 2950N false bunds for noise and visual screening of road, to have gently undulating long profile and irregular slopes to give a more natural appearance when viewed from the old A90.

LV44. Ch2720 to 2980 both sides, scrub / shrub mix planted on false cutting to help screen the new road from Stoneyards and Dambrae, also to screen noise barrier where necessary, whilst retaining some views east from Stoneyards.

LV45. Ch2980 to 3390 both sides, mixed woodland planting to help integrate the road into the landscape, and also to provide a compensatory landscape feature and habitat for the plantation woodland lost to the road.

LV46. Ch3400S to 4000S, landform to create a noise barrier of naturalistic appearance between the road and the houses along the track to Aikenshill, returned to agriculture as far as possible.

LV47. Ch4130N to 4460N, the embankment would be extended into a false cutting at least 1.5m higher than the adjacent carriageway edge to provide immediate screening of cars on the road from Blair Lodge. The western face of the bund would be flattened out and substantially rounded to present a naturalistic face to the outside.

LV48. At about ch4100 and ch4500 the level of the new road centreline would be no more than 600mm above the existing ground levels, so that the embankment past Blair Lodge is tapered and controlled in height.

LV49. Ch4130N to 4460N, mixed woodland would be planted on the outside face of the bund to 4370N, and scrub / shrub mix on the outside face north of 4370N, to help integrate new road and landform into local landscape and to screen noise barrier where necessary, whilst allowing some views east and south-east from Blair Lodge.

LV50. Ch4840 or thereby, the level of the new A90 where it crosses the realigned A975 would be no more than 3.5m above existing ground level so as to avoid the creation of an intrusive landform in this open, gently sloping landscape.

LV51. Ch4600 to the realigned A975, the islands of land in the junction and the side road slips would be planted with mixed native woodland, covering at least 70% of the available area, and including glades within the larger island, to create an attractive new landscape feature to help integrate the junction into the wider landscape whilst also providing landscape and biodiversity / habitat benefits.

LV52. Ch5200N to 5320N, between the new A90 and the realigned old road, the land would be mounded to no more than 1.5m above existing levels and a mixed native woodland copse would be planted, to screen the old road from the new (particularly headlights) and to reinforce visually the realignment of the old road for road safety purposes.

LV53. Ch5320N to 6010N, the area of land between the new and the old would be subject to subtle land-raise to improve the separation of the old and new roads and screening from the roadside houses. The extent of the land-raise would be subject to the availability of fill with priority given to improving screening for the roadside houses. This would involve the raising of the land by no more than 2m maximum, graded out gently (slopes under 10%) as a naturalistic gently rolling landform varying in height along the line of the road and returned to agriculture on completion.

LV54. A copse of mixed native woodland would be planted on the northwest side of the SUDS pond between ch5980 and 6040, extended into the pond as an area of mixed willow scrub. Smaller copses of mixed willow scrub would be planted on the SW and NE corners of the SUDS pond. All to help integrate the SUDS feature into the landscape and provide habitat benefits.

LV55. Ch6120 to Foveran overbridge both sides, the line of the old road and the remnant fields either side would be planted up to help screen the new road and side roads from Foveran School and from Mill of Foveran.

LV56. Ch6340N to 6400N, cutting would be planted with mixed native woodland to blend in with the new woodland planted in the field to the west.

LV57. Ch6850 to 7000 both sides, and Pitmillan overbridge side road within 30m of the main line cutting, side slopes planted up with mixed deciduous woodland to help screen the road from the cottages at Pitmillan and to create a minor feature of biodiversity value in this open intensive agricultural landscape.

LV58. Ch7640 or thereby, the level of the new A90 where it crosses the realigned B9000 would be no more than 2m above existing ground

level so as to avoid the creation of an intrusive landform in this open, gently sloping landscape.

LV59. From the realigned B9000 overbridge to ch7800 and between the northbound slip and the realigned B9000 north to ch8350, the islands of land in the junction and the side road slips would be planted with mixed native woodland, covering at least 70% of the available area, and including glades within the larger island, to create an attractive new landscape feature to help integrate the junction into the wider landscape whilst also providing landscape and biodiversity / habitat benefits.

LV60. An area of lower growing and decorative shrubs (species to be determined at detailed design stage) would be planted in front of the house at Fountainbleau (ch8000 to 8050) in order views out are retained.

LV61. A small copse of mixed native woodland would be planted in the triangle of land between the diverted side road and the swale at ch8430S to 8500S to improve the screening of traffic in views from the north.

LV62. A similar clump would be planted on the north side of the SUDS pond at ch8800 for the same reasons.

LV63. A mixed native hedge with standard oak trees would be planted either side of the new link road between Tipperty and the B9000 to help integrate this into the landscape.

Archaeology and Cultural Heritage

CH1 A systematic intrusive survey would be undertaken by archaeologists for all areas affected by the proposals to identify undiscovered archaeological sites that could be affected by construction. This survey would be undertaken post-consent but prior to construction. Historic Scotland have suggested that 10% of the new land take should be trial trenched by machine. This trial trenching is in addition to the excavation of known sites that would be affected. The survey methods would be agreed with Historic Scotland and Aberdeenshire Council as part of a programme of works to be undertaken in advance of construction.

CH2 Geophysical survey would be used in areas identified as sensitive or deemed necessary by Historic Scotland and Aberdeenshire Council.

CH3 Any new sites, identified by intrusive trial trenching and/or geophysics, which would be affected by construction would be excavated and recorded as required by best practice.. The records would be lodged with the NMRS. A report of any discoveries would be completed to a suitable standard and copies submitted to the NMRS, the local SMR and Historic Scotland. A short account of the work and findings would also be submitted to Discovery and Excavation Scotland.

CH4 All known or discovered sites in proximity to the works would be fenced.

CH5 Any linear features affected by the works (e.g. stone walls) would reinstated to the edge of the works.

CH6 Drumhead cropmark would be trial trenched to determine the depth, extent and character of surviving archaeology if it cannot be avoided by the detailed design. If it is found that archaeological features could

be disturbed then the site would be excavated and recorded to a suitable standard prior to construction.

CH7 The mill lade at Snarleshow, Dambrae would be recorded to a suitable standard by an archaeologist. The record would include a description and photographs.

CH8 The upright stone at Kirkhill would be recorded to a suitable standard by an archaeologist. The record would include a description and photographs. The stone would be relocated to the side of the re-routed road if necessary.

CH9 The upright stone at Overhill would be recorded to a suitable standard by an archaeologist. The record would include a description and photographs. The stone would be relocated to a suitable location nearby.

CH10 Pitgersie Bridge cropmark would be trial trenched to determine the depth, extent and character of surviving archaeology if it cannot be avoided by the detailed design. If it is found that archaeological features could be disturbed then the site would be excavated and recorded to a suitable standard prior to construction.

CH11 The mill lade at Mill of Foveran would be recorded to a suitable standard by an archaeologist. The record would include a description and photographs.

CH12 The overall design strategy for the B977 link road has been to place the link road sympathetically in the existing landscape, following both the lie of the land and existing field patterns. The B977 would be bordered by a mixed hedge of native species with some trees to give the impression of a country lane. Other mitigating factors are that the site has already been compromised by modern features.

CH13 The overall design strategy for the A90(T) where it passes Orrock House has been to respect the open landscape setting of Orrock House. The visual intrusion of the A90(T) would be minimised by placing it as close to existing levels as possible and creating a naturalistic landform where it passes through the nearby ridgeline. The new road would be bordered with drystone walls of a similar character to the existing field boundaries in this area and some new planting.

CH14 Where the new A90(T) would pass Mill of Foveran, remnant fields would be planted in order to screen the road from the listed building. In addition the new A90(T) would be in a slight cutting at this point.

Disruption due to Construction

DDC1. The contractor would be required to ensure that vehicles on the existing A90, B977, A975 and B9000 and other side roads were safely routed through construction areas and to ensure that works were planned to limit the risk of disruption taking account of any other ongoing construction activities in the area.

DDC2. Information would be given during the life of the contract to warn drivers in advance about the presence of queues and the anticipated delay to journeys as a result. This would be via radio station traffic updates and bulletins. Queue lengths would be checked during construction activities requiring contraflows and the information used to inform traffic information outlets including the Traffic Scotland signs in the wider road network.

DDC3. Effective liaison by the contractor with the communities close to the construction areas would be maintained. This would include circulation of information about ongoing activities and a contact telephone number for use by the local community to contact the contractor for information. The telephone would be attended during all operational hours and the person(s) with the appropriate authority to resolve any problems that occur would be available. A log of all complaints and actions taken would be available for inspection.

DDC4. The contractor would be required to consider potential traffic and transport related effects as part of all relevant method statements and to include appropriate mitigation measures for all activities where the potential for significant effects was identified.

DDC5. Any complaints from the public would be followed up immediately and wherever feasible mitigation measures identified and implemented to ensure that complaints in the future were eliminated.

DDC6. The contractor would be required to comply with all contract requirements regarding access and to consult with Aberdeenshire Council Roads Department on all proposed traffic control measures on access routes and in advance of movement of any heavy loads.

DDC7. All construction traffic HGV drivers would be briefed on the importance of observing speed limits, in particular through residential areas.

DDC8. All HGV drivers would be briefed on the importance of allowing traffic to pass safely and not causing an obstruction to other road users.

DDC9. The contractor would be encouraged to establish haul roads, internal to the scheme, as early in the contract as possible to reduce the effects of construction traffic on the local road scheme.

DDC10. Access to all properties would be maintained and all necessary diversion routes would be clearly signed.

Noise and Vibration

NV1. Silenced or sound reduced compressors, fitted with acoustic enclosures, would be used.

NV2. Silencers or mufflers would be fitted to pneumatic tools.

NV3. Deliveries would be programmed to arrive during daytime hours only and care would be taken to minimise noise when unloading vehicles.

NV4. Delivery vehicles would be prohibited from waiting within the site with their engines running.

NV5. Plant items would be properly maintained and operated according to manufacturers' recommendations, in such a manner as to avoid causing excessive noise. All plant would be sited so that the noise impact at nearby noise-sensitive properties is minimised.

NV6. Local hoarding, screens or barriers would be erected as necessary to shield particularly noisy activities.

NV7. Access to the site would primarily be via the existing A90, which would limit the potential for construction traffic noise impacts.

NV8. Where access is required via the minor road network, appropriate minor roads would be identified and listed within the construction contract details. The use of other minor roads would be prohibited.

NV9. Appropriate noise limits and working hours would be specified in the contract documents, and if required, in the construction Environmental Management System. It is assumed that construction activities would

be undertaken during daytime periods only, between the hours of 08:00 to 19:00 hours Monday to Friday and 08:00 to 13:00 hours on Saturday. Should occasional night-time and Sunday working be required, for example to allow erection of superstructures at bridge sites to minimise traffic disruption on the local road network, the contractor would be required to receive permission from Aberdeenshire Council Planning and Environmental Services Department, in advance.

NV10. The contractor would be required to establish and maintain effective liaison with the local community throughout the construction period. This would include provision of information on the on-going activities and provision of contact telephone numbers to contact the site for information during operational hours. A person would be identified with appropriate authority to resolve any problems. A log of complaints and actions taken to remedy these would be available for inspection.

NV11. The scheme design is such that there would be minimal disposal of earth to off-site locations, limiting noise from construction traffic.

NV12. Piling works would only be required during the construction of the Foveran Overbridge with other structures, e.g. those at Balmedie Junction, South Orrock, Orrock, Dambrae, Newburgh Road Junction and Tipperty incorporating either cast in place reinforced concrete box or portal structures, or bankset foundations on reinforced abutments, or spread footings. The proposed piling method is not currently known, but where possible, the use of cast in place or augured piling, rather than impact driven piling would be adopted.

NV13. During backfilling, roller capping, sub-base compaction and black topping works, it is anticipated that the use of vibratory rollers would be required. As such, it is proposed that vibration monitoring would be undertaken when such operations are undertaken in close proximity to sensitive receptors. This would be undertaken in accordance with the recommendations outlined in BS 5228 Part 4 and BS 7385 Part 1:1990: Evaluation and measurement for vibration in buildings, Part 1: Guide for measurement of vibrations and evaluation of their effects on buildings. The results of such monitoring would be used to ensure that the vibration levels comply with the requirements of BS 7385 Part 2 (which considers the potential for building damage) and BS 6472 (to comply with the recommendations for human comfort).

NV14. The use of a lower noise road surface for the proposed A90(T) route. Lower noise road surfaces assist in the control of noise from the road/tyre interface (rather than the other key component which is engine, exhaust and transmission noise). Benefits are therefore greatest at high speeds, as applicable to the proposed A90 (T).

NV15. A 1.2m high stone wall, timber barrier or earth bund on the western side of the A90, along the top edge of the cutting between ch1080 to 1170, adjacent to The Holdings.

NV16. A 0.8m high road side earth bund on the western side of the proposed A90 extending from ch320 to 520 adjacent to Drumhead Lodge, surmounted with a 1.6m high stone wall or timber barrier along it's length, and extending to chainage 550 in the north. Alternatively, an equivalent 2.4m high earth bund between ch320 and 520, reducing in height to 1.6m between ch520 and 550.

NV17. A 1.5m high road side stone wall, timber barrier or earth bund on the western side of the proposed A90 extending from ch1300 to 1900 and ch1930 to 2270 and following the top of proposed cut and fill design.

NV18. A 1.8m high timber noise barrier between ch2200 to 2700 and ch2720 to 3300, on top of a 2m high road side earth bund between ch2270 to 2700 and ch2720 to 3300, on the western side of the proposed A90, adjacent to Wardhead and Stoneyards. Alternatively, an equivalent earth bund, 1.8m in height between ch2200 to 2270 and 3.8m in height between ch2270 to 2700 and ch2720 to 3300.

NV19. Incorporation of an earth bund varying in height between 2 and 4m on the eastern side of the proposed A90 extending from ch3400 to 4000, adjacent to Aikenshill.

NV20. A 1.8m high timber noise barrier located on top of a 2m high road side earth bund, or equivalent 3.8m high earth bund extending from ch4100 to 4600 on the western side of the proposed A90 and adjacent to Kirkhill.

NV21. A 1.2m high timber roadside noise barrier, stone wall or earth bund located along the eastern side of the A90 from ch8050 to 8680

Air Quality

AQ1. All vehicles carrying loose aggregate and workings would be sheeted at all times where these could give rise to dust at nearby properties.

AQ2. Design controls for construction equipment and vehicles and use of appropriately designed vehicles for materials handling would be implemented.

AQ3. Completed earthworks would be covered or vegetated as soon as practicable.

AQ4. The site would be regularly inspected and site boundaries checked for dust deposits (which would be removed where necessary). In addition local roads would be cleaned when necessary.

AQ5. Surface areas of open stockpiles would be minimised (subject to health and safety, soil storage and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick up.

AQ6. Dust-suppression tools would be used for all operations.

AQ7. All construction plant and equipment would be maintained in good working order and not left running when in use.

AQ8. Onsite-movements would be restricted to well within the site and not near the perimeter, wherever possible.

AQ9. There would be no unauthorised burning of any material anywhere on site.

AQ10. Liaison with the council would be maintained throughout the construction process.

Pedestrians, Cyclists, Equestrians and Community Effects

PLE1. Grade separated access routes across the new A90(T) would be provided for vehicles and non-vehicle users including footways at Balmedie.

PLE2. A farm access would be provided at Aikenshill to allow movement of stock and farm vehicles between fields.

PLE3. Alternative routes would be signed for any access route temporarily affected during construction.

PLE4. The visual barrier of the new road would be mitigated, in part, by careful design and new planting.

PLE5. The contract documents would specify construction traffic routes which use the existing A90 and road network as far as possible.
PLE6. Construction traffic would only access and egress the construction working areas using the strategic road network unless local trips or importing from local sources (e.g. quarries etc).
PLE7. A new shared pedestrian/cycle path to Belhelvie Church from Balmedie via the Keir Farm underpass would be provided.
PLE8. All side road bridges would have footway provision.
PLE9. Access to all properties would be maintained throughout construction.

Vehicle Travellers

VT1. The Contract Documents would define routes which could be used by construction traffic and on which HGVs would be allowed to travel on site related business.
VT2. Queue lengths would be checked during construction activities requiring contraflows by the contractor and the information used to inform traffic information outlets including the Traffic Scotland signs in the wider road network.
VT3. Use would be made of the local media (newspaper, radio and television) to warn local residents and road travellers in advance of construction work which may affect access to properties or which may cause delays to drivers and broadcasting of radio traffic bulletins on delays and queues on any strategic roads affected by construction works.
VT4. Information on delays on the network would be available to drivers from existing VMS installations on the strategic road network and a VMS on the new road once operational.

ANNEX C

ENVIRONMENTAL MITIGATION TABLES

Traffic

Potential Impact	Sensitivity of Resource	Magnitude of Impact	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect
Permanent					
N/A					
Construction					
Disruption to local and commuting traffic and an increase in journey times during scheme construction. The roads which potentially would be most likely to be affected would include: • the existing A90; • the B977 linking the A90 with Belhelvie; • the A975 linking the A90 to Newburgh; • the B9000 to Newburgh and west to Pitmedden; and • local roads linking the scattered settlements in the scheme area	Medium	Medium	Moderate	DDC1-DDC10, GEN5 and GEN 6	**Minor/Moderate**
Effects of special loads on the existing road network Cumulative effects on local roads if other major construction projects were programmed for the same time and the proposals	Medium	Medium	Moderate	DDC6, DDC7, DDC8 and DDC9 • No known major consented proposals in the area at present. If Menie Estate proposals are consented liaison with the Council on programming and access routes would reduce the likely impacts. The majority of HGV movements for the A90(T) would be internal to the site	Minor
Operational					
Improved reliability of journeys for all traffic users including freight and public transport	Medium	Medium	Moderate Positive Impact	• Design of proposals to current standards	**Moderate Beneficial**

The Transport and Planning Policy Context

Potential Impact	Sensitivity of Resource	Magnitude of Impact	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect
Permanent					
A loss of 0.93ha of land designated for employment development in Balmedie	Low	Moderate	Minor/Moderate	LU11 and LU12	**Minor/Moderate Adverse**
Effects on setting of historic resources	High	High	Major	Sensitive landscape design including planting and stone walls	Moderate
	The A90 Balmedie to Tipperty Dualling proposals are broadly in accordance with the national, regional and local plan policies and guidance. Although the proposed scheme does not actively promote a modal shift to more sustainable modes of transport, the scheme would not lead to an increase in traffic on the road			Mitigation has been defined for any potentially significant impact on the environment to ensure that any residual effects are reduced to the minimum for safe implementation of the development	Minor

Land Use and Property

Potential Impact	Sensitivity of Resource	Magnitude of Impact	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect
Permanent					
Direct and indirect impacts to properties including demolition, interruption of access etc	High	Medium	Moderate	LU2, LU3, LU4, LU5, LU7, LU8, LU9 LU11 and LU12,	Minor
Loss of garden from three houses at South Folds and No.6 at The Holdings	High	High	Major	LU2, LU3 and LU12	**Major**
Loss of the driving range from East Aberdeenshire Golf Club	Low	Medium/High	Moderate	LU4, LU11 and LU12	**Moderate**
Interruption to footways, cycleways and bridleways	Medium	Low	Minor	LU5, LU7, LU8, LU9 and LU10	Minor
Direct and indirect impacts to current land uses	Medium	Low	Minor	LU1 and LU12	Minor
Permanent loss of land to the proposals; incompatibility of new land uses with existing land uses	High	Medium	Moderate/Major	LU12	Minor
Impacts to utilities in the area	Medium	Medium	Moderate	LU13 and LU14	Minor
Construction					
Conflicts between construction needs and users of the existing A90	Medium	Medium	Moderate	LU5, LU11, PLE6 and PLE9	Minor
Interruption to existing land uses and agricultural activities by ongoing construction activities	Medium	Low	Minor	LU5, LU11, LU12, PLE6 and PLE9	Minor
Increased hazards to users of the area from construction activities	High	Low	Moderate	LU5 and LU11	Minor
Interruptions to services through interference with utilities	Medium	Low	Minor	LU3 and LU4	Minor
Operational					
Improved travelling time and driver safety	Medium	Medium	Moderate Beneficial	Well designed scheme	**Moderate Beneficial**
Interference with current activities because of changed traffic patterns	Medium	Low	Minor	LU5	Minor

Agriculture, Forestry and Sporting Interests

Potential Impact	Sensitivity of Resource	Magnitude of Impact	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect
Permanent					
Loss of Prime (LCA Class 3_1) agricultural land	High	High (Loss of 20.99ha)	Major	AG1 Regrading to allow return of land to agriculture (estimated 0.27ha) Farmers would be financially compensated for the value of land lost and for injurious affection and disturbance	Major (Loss of net 20.72ha)
Loss of non-Prime land (LCA Class 3_2) agricultural land	Medium	Medium (Loss of 84.82ha)	Moderate	AG1 Regrading to allow return of land to agriculture (estimated 16.45ha) Farmers would be financially compensated for the value of land lost and for injurious affection and disturbance	**Moderate Adverse** (Loss of net 68.37ha)
Loss of woodland and commercial forestry	Low	Low (Loss of 11.87ha of which 6.41ha is commercial forestry)	Minor	AG1, AG21 Financial compensation for value of land and forestry lost	Minor (Loss of 11.79ha approx)
Severance of agricultural land	Medium	Medium (severance of 173.59ha)	Moderate	Provision of new access to all severed land using scheme structures or accommodation works tracks and underpass Financial compensation for future disturbance	**Major adverse** for one unit, Seven Acres where viability compromised
Construction					
Temporary loss of land and disturbance	Medium	Low	Minor	AG2, AG3, AG7, AG8 and AG9 – AG19 Return of land to agriculture post construction. Estimated 16.45ha of which 0.27ha prime land	Minor

Potential Impact	Sensitivity of Resource	Magnitude of Impact	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect
				Financial compensation for disturbance	
Operational					
Traffic effects on farm vehicles	Medium	Medium	Moderate	AG2 Delivery of the scheme including Aikenshill Underpass	**Moderate Beneficial** The scheme would provide safer and easier access for farm traffic
Risk of disease from animals transported on the new road (including risk of airborne disease to pigs at Pitmillan Farm)	High	Not known	Not known but potential for effects	AG11 and AG15 No specific mitigation as part of the scheme design possible Increased airborne disease risk managed by appropriate vaccination of stock. Reasonable claims for injurious affection and disturbance would be payable	Not significant (because of mitigation)

Geology and Soils

Potential Impact	Sensitivity of Resource	Magnitude of Impact	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect
Permanent					
Removal of *in situ* materials	Low	Low	Minor	G1, G2, G3 and G4	Not significant
Burial of sites and materials of geological interest	Low	Low	Minor	G1, G2	Not significant
Loss of valuable soils	Low	Low	Minor	G1, G4, G5 and G6	Not significant
Physical damage of soils	Low	Low	Minor	G1, G5, G6	Not significant
Construction					
Encountering contaminated land	Low	Low	Minor	G11	Not significant
Pollution of soils and sediments from spills	Moderate	Medium	Moderate	G6-G11, Dr1-15	Minor
Operational					
Pollution of soils and sediments by spillages from fuel and oil storage areas, discharges, operational and maintenance activities	Moderate	Medium	Moderate	G6-11, Dr1-15	Minor

Road Drainage and the Water Environment

Potential Impact	Sensitivity of Resource	Magnitude of Impact	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect
Permanent					
Changes to surface water morphology through realignment, culverting etc of watercourses and alterations to the beds of watercourses and drains	Medium	Medium	Moderate	Dr1-Dr3, DR5 – DR8	Minor
Changes to drainage characteristics, aquatic habitats and hydrology in the locality of the site through physical works	High	Medium	Moderate/Major	Dr1-3, Dr7, Dr8	Minor
Changes to the hydrogeology/hydrology of the area through physical works	High	Medium	Moderate	Dr1-Dr3, Dr7,Dr8	Minor
Impacts on surface water abstractions	Medium	Medium	Moderate	Dr9	Minor
Impacts to existing discharges	Low	Low	Minor	Dr1,Dr2	Minor
The potential for the scheme to affect flooding in the area	Medium	Medium	Moderate	DR3 and DR5	Minor
Construction					
Discharge of construction drainage potentially contaminated with sediments or materials used on site (fuels, lubricants, hydraulic fluids etc); impacts from dust deposition in existing water features	High	High	Major	Dr5, Dr8, Dr11, Dr12	Minor
Impacts from discharge of sewage and effluent from the site compound facilities;	High	Medium	Moderate/Major	Dr13	Not significant
Pollution from accidental spillages or discharges of fuels, oils, chemicals etc;	High	High	Major	Dr1-5, Dr8, Dr10-12	Minor
Pollution from waste materials, dust etc from handling contaminated land on-site.	High	Moderate	Moderate	G11, AQ1, AQ5, Dr 1	Minor
Operational					
Pollution of watercourses from road run-off; impacts from spills of fuel as a result of accident	High	High	High	Dr1, D5, Dr14-15	Minor
Release of polluted materials from maintenance activities such as cleaning gully pots; herbicides used to control plant growth on verges or the central reserves	Moderate	Moderate	Moderate	Dr14-15	Minor
Biological effects from pollution incidents	High	High	High	Dr1, D5, Dr14-15, EC18, EC19, EC20,EC22	Minor

Ecology and Nature Conservation

Potential Impact	Sensitivity of Resource	Magnitude of Impact	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect
Permanent					
Permanent loss of habitat or species due to permanent or temporary landtake for the proposals	Medium	Medium	Moderate	LU12, EC1-14, Dr5, Dr6	Minor
Creation of barriers to the movements of animals, especially mammals, amphibians and invertebrates and plants with limited powers of dispersal by the permanent works	Medium	High	Moderate/Major	EC5, EC7, EC18 and EC21	Minor
Fragmentation of habitat or severance of ecological corridors between isolated habitats of ecological importance	Low	Medium	Minor/Moderate	EC1- EC5 and EC7	Minor
Alterations to drainage regimes which may affect adjacent habitats (see also Road Drainage and the Water Environment Table)	Medium	Medium	Moderate	EC4, EC14, EC16, EC22,Dr1-3,Dr5,Dr8	Minor
Creation of new habitats and introduction of species as a result of reinstatement works, habitat enhancement proposals and landscaping	Low	Moderate	Moderate beneficial	EC2, EC3, EC4 and EC11	**Moderate Beneficial**
Construction					
Disturbance or damage to adjacent habitat not required for the proposals through construction activities (movement of vehicles and personnel, artificial lighting, dust, spillage of fuels and chemicals, emissions and noise)	Low	Medium	Minor/Moderate	EC13, EC14, EC15, EC16 and EC17	Minor
Disturbance to or displacement of wildlife in proximity to the site through construction activities including noise and vibration from piling activities	High	Medium	Moderate/Major	EC6, EC8, EC10, EC11, EC12, EC13, EC18 and EC21	Minor
Temporary severance of wildlife	Medium	High	Moderate	EC7,EC8 and EC21	Minor

Potential Impact	Sensitivity of Resource	Magnitude of Impact	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect
corridors					
Pollution containing high levels of sediment entering the watercourses and indirectly impacting on the Ythan SAC/SPA	High	Moderate	Major	EC18, EC19, EC20,EC22,Dr1-Dr15	Minor
Introduction of alien species during the construction works.	Low	Low	Minor	GEN11,GEN12	Minor
Operational					
Kills, disturbance or displacement of animals from increase in speed/volume of traffic; effects on wildlife from increased noise from the road	Medium	Moderate	Minor/Moderate	EC5, EC7, EC8 and EC9	Minor
Effects on wildlife from changes in night-time lighting conditions	Medium	Low	Minor	GEN18	Minor
Effects from the discharge of site runoff which could be contaminated with oil, de-icing salts, heavy metals and suspended solids which could impact on water quality or adjacent habitats	High	Medium	Moderate	EC18, EC19, EC20, EC22, Dr1, Dr8, Dr14 and Dr15	Minor
Damage or disturbance to habitat or species adjacent to the proposals through operational activities	Medium	Low	Minor	EC7, EC8, EC9, EC22, Dr14 and Dr15	Minor

Landscape and Visual Impact Assessment

Potential Impact	Sensitivity of Resource	Magnitude of Impact	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect
Visual Impacts					
Impact on residential properties (potential impact on 70 receptors or groups of receptors within the visual envelope)	High	Different for each receptor (see Appendix 11.2)	Major adverse – 6 Moderate adverse – 14 Minor adverse – 20 No change – 10 Minor beneficial – 14 Moderate beneficial – 6	Different for each receptor (see Section 11.7 and Appendix 11.1)	**Major adverse** at Stoneyards, No 6 The Holdings[1] **Moderate adverse** at South Folds, the Cock and Bull and two adjacent cottages, Orrock House, Orrock Mains, Seven Acres, Hill of Menie (house at end), Aikenshill and Blair Lodge Minor adverse – 23 No change or minor but neutral – 13 Minor beneficial – 14 **Moderate beneficial** at The Bungalow, Sidney Cottage, Seaview, Newtyle Stables (group of four detached houses), Rashierieve, Blairythan Smithy, Westfield Cottage, and at Old Mill Croft and the adjacent houses

[1] Subject to detailed design study which should be able to reduce this to moderate adverse

Potential Impact	Sensitivity of Resource	Magnitude of Impact	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect
Visual Impacts					
Impact on workplaces and places of indoor recreation (potential impact on 5 receptors or groups of receptors within the visual envelope, also potential impact on 16 farms or similar which are both residential and workplaces, which have been included above)	Low	Different for each receptor (see Appendix 11.2)	Moderate adverse - 1 Minor adverse – 3 Minor beneficial - 1	Different for each receptor (see Section 11.7 and Appendix 11.1)	Minor adverse – 3 Minor but neutral – 1 Minor beneficial – 1
Impact on outdoor recreation receptors (potential impact on 2 receptors within the visual envelope)	High	Different for each receptor (see Appendix 11.2)	Moderate adverse – 1 No change – 1	Different for each receptor (see Section 11.7 and Appendix 11.1)	No change – 1 Minor beneficial – 1
Impact on transport receptors (potential impact on a users of a wide network of minor roads and local A roads within the visual envelope)	Moderate	Different for each potential receptor location	Minor adverse to no impact	No specific mitigation but benefit from mitigation for landscape reasons and for specific receptors above	Minor adverse to no impact

Archaeology and Cultural Heritage

Potential Impact	Sensitivity of Resource	Magnitude of Impact	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect
Permanent					
Physical impact to previously unidentified and undocumented archaeology	Unknown	Unknown	Unknown	CH1 - CH4	Unknown but not anticipated to be significant
Direct impacts to historic sites	Local, regional and national	Two local sites removed; four local sites would be partially lost; other sites avoided (84)	Moderate where direct impact	CH7 – CH11 Where physical impact on a site could not be avoided, the site would be revealed/excavated to determine whether there would actually be an impact by the route. If the archaeology was unavoidable then it would be excavated and recorded to a suitable standard. Where the site is upstanding, rather than buried archaeology, it would be recorded to a suitable standard	Minor
Indirect impacts to historic sites (setting etc)	National	High	Major	CH12 – CH14 Implementation of committed mitigation and in particular the LV1 - LV63 and NV1 - NV23	There would be **Moderate Adverse** effects on the settings of Hare Cairn SAM and Orrock House and Gatepiers and minor adverse effects on Orrock House Dovecot and the Mill of Foveran. There would be no effect on Balmedie House Lodge, Balmedie House, Menie House and

Potential Impact	Sensitivity of Resource	Magnitude of Impact	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect
					Temple Stones, a minor beneficial effect on Belhelvie Old Parish Church and a **Moderate Beneficial** effect on Menie House Lodge

Disruption due to Construction (traffic related-other issues contained in construction sections of other environmental tables)

Potential Impact	Sensitivity of Resource	Magnitude of Impact	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect
Permanent					
N/A					
Construction					
Disruption to local and commuting traffic and an increase in journey times is likely to occur during the scheme construction	Medium	Minor	Minor/Moderate	DDC1-DDC10, GEN5 Signalised junctions would be included to control traffic flow	Minor
Effects of special loads on the existing road network Cumulative effects on local roads if other major construction projects were programmed for the same time and the proposals	Medium	Medium	Moderate	DDC6 – DDC9 No known major consented proposals in the area at present. If Menie Estate proposals are consented liaison with the Council on programming and access routes would reduce the likely impacts. The majority of HGV movements for the A90(T) would be internal to the site	**Moderate Adverse**
Operational					
N/A					

Noise and Vibration

Potential Impact	Sensitivity of Resource	Magnitude of Impact	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect
Permanent					
None					
Construction					
Construction plant noise on local noise-sensitive Receptors	High	No impact to temporary high adverse	No impact to temporary major adverse	Good practice construction works. Construction works undertaken during agreed times only	No impact to temporary **Moderate Adverse**
Construction traffic on local noise-sensitive receptors	High	No impact to temporary medium adverse	No impact to temporary major adverse	Construction traffic routes only permitted to use certain local routes which are to be listed in the construction contract	No impact to temporary minor adverse
Traffic diversions on local noise-sensitive receptors	High	Temporary high beneficial to temporary high adverse	Temporary beneficial major to temporary major adverse	Majority of work to be undertaken off-line to avoid unnecessary traffic diversions	Temporary **Major Beneficial** to temporary **Major Adverse**
Construction vibration	High	No impact to temporary medium adverse	No impact to temporary adverse high	Vibration monitoring to be undertaken during vibration generative construction operations	No impact to temporary minor adverse
Operational					
Road traffic noise level changes at local noise sensitive receptors	High	High beneficial to high adverse	Major beneficial to major adverse	Low noise road surface, landscape design and incorporation of noise wall, fences and bunds.	**Major Beneficial** to **Major Adverse**
Airborne road traffic noise induced vibration	High	High beneficial to high adverse	Major beneficial to major adverse	As above	**Major Beneficial** to **Major Adverse**

Air Quality

Potential Impact	Sensitivity of Resource	Magnitude of Impact	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect
Permanent					
There will be no permanent impacts associated with the scheme.	NA	NA	NA	NA	NA
Construction					
Generation and deposition of dust	High	Low	Minor adverse	AQ1-AQ9	Minor adverse
Elevation of PM_{10} concentrations due to on site construction activities	High	Low	Minor adverse	AQ1-AQ9	Not significant
Reduction in air quality due to construction traffic	High	Low	Minor adverse	AQ1, AQ8 and AQ9	Not significant
Operational					
Change in total emissions of pollutants	High	Low	Minor adverse	Scheme shown to not induce traffic	Not significant
Change in local pollution concentrations	High	Low	Minor adverse and minor beneficial	NA	Minor adverse and minor beneficial

Pedestrians, Cyclists, Equestrians and Community Effects

Potential Impact	Sensitivity of Resource	Magnitude of Impact	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect
Permanent					
Permanent changes in journey length or ease of journeys for pedestrians, cyclists and equestrians through the changes in infrastructure (for example, path diversions, stopping up tracks etc)	High	Low	Moderate beneficial	PLE1, PLE2, PLE7, PLE8	There would be **Moderate Adverse** effects on vehicle journey lengths from The Holdings, Belhelvie Church, Belhelvie Community Centre, residential properties in Belhelvie, Drumhead Cottage, Drumhead Lodge and Fornety to access Balmedie and Tipperty. For pedestrians there would be **Major** permanent **Adverse** effects on journey length from The Holdings, Belhelvie Church, Belhelvie Community Centre, residential properties in Belhelvie, Drumhead Cottage, Drumhead Lodge, Kirkhill, Easter Hatton and Fornety to access Balmedie and Tipperty. For cyclists there would be a **Major Adverse** permanent effects on journey length from Drumhead Lodge and Fornety to access Balmedie and Tipperty
Permanent changes in the ease of making journeys through increases in traffic on existing roads	Medium	Medium	Moderate beneficial	Scheme does not induce traffic. Benefits on A90	**Moderate Beneficial**
Construction					
Temporary changes in journey length or ease of making journeys for pedestrians, cyclists and equestrians through construction activities	High	Medium	Moderate/Major	PLE3, PLE5, PLE6, PLE9	Minor/**Moderate Adverse**
Operational					
Safer and more enjoyable cycling on existing roads due to reductions in the volume of traffic	Medium	Medium	Moderate beneficial	Scheme design	Moderate
Safer access for equestrians to the coast	Low	Medium	Minor beneficial	Scheme design	Minor

Potential Impact	Sensitivity of Resource	Magnitude of Impact	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect
Increased travelling time for residents of the scattered settlements to travel to local amenities	Medium	Low	Minor/Moderate	PLE1	Minor
Disruption to pedestrian activity from increased traffic on some side roads	Medium	Low	Minor	PLE7 and PLE8. Traffic increases low and reduced on some roads	Minor

Vehicle Travellers

Potential Impact	Sensitivity of Resource	Magnitude of Impact	Significance of Unmitigated Impact	Mitigation	Significance of Residual Effect
View from the Road					
Permanent					
Change in view from the existing A90	Low	Low	Minor	Scheme design	Minor
New views created from the construction of the A90(T)	Low	Low	Minor	Mitigation planting and LV1-LV63	Minor beneficial and adverse effects. Views from the A90(T) are generally good except where entering a deep cutting at Stoneyards and Dambrae
Driver Stress					
Permanent					
None perceived					
Construction					
Increased frustration for drivers resulting from delays caused by traffic management measures used to facilitate construction	Low	Medium	Minor/Moderate	VT1, VT2, GEN6, DDC4, DDC5 and DDC10	Minor
Confusion for drivers caused by road works (narrow lanes; signs etc)	Low	Medium	Minor/Moderate	VT3 and VT4	Minor
Operational					
Decrease in driver stress for both local traffic and commuters	Low	Medium	Moderate Beneficial	N/A	**Moderate Beneficial**

ANNEX D

GAZATTEER OF PHOTOGRAPHS

Photograph 1

Temple Stones Scheduled Ancient Monument (SAM)

Photograph 2

View Looking South from Easter Hatton towards Blackdog

Photograph 3

View from the Southern Entrance to Balmedie looking South towards South Folds

Photograph 4

View from South Folds towards the Southern Entrance to Balmedie

Photograph 5

Hare Cairn SAM

Photograph 6

Looking West along the B977

Photograph 7

Looking South East from Orrock House towards Balmedie

Photograph 8

Belhelvie Old Parish Church (B-Listed)

Photograph 9

Looking East towards Pettens

Photograph 10

Orrock House (A-Listed)

Photograph 11

View from South Orrock towards the Coast

Photograph 12

Dambrae and Stoneyards

Photograph 13

The Ponds at Dambrae

Photograph 14

View North towards Aikenshill

Photograph 15

View North West from Aikenshill

Photograph 16

Rashierieve

Photograph 17

Looking South West along the A975

Photograph 18

Looking South from Foveran Junction

Photograph 19

Pitgersie Bridge over the Foveran Burn

Photograph 20

Mill of Foveran (B Listed)

Photograph 21

Pitmillan Piggery

Photograph 22

Looking North along the A90 towards Fountainbleau

Photograph 23

Fountainbleau

Photograph 24

Looking East towards Fornety

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