Roads Service

A26 Dualling - Glarryford to A44 Drones Road Junction

Stage 1 Scheme Assessment

ISSUE 2

Roads Service

A26 Dualling - Glarryford to A44 Drones Road Junction

Stage 1 Scheme Assessment

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This Stage 1 Scheme Assessment provides a 'corridor' appraisal for the route and identifies the environmental, engineering, economic, and traffic advantages, disadvantages and constraints associated with broadly defined improvement strategies. The study was undertaken in accordance with the *Design Manual for Roads and Bridges* (DMRB), *TD 37/93 – Scheme Assessment Reporting*, and the *New Approach to Appraisal* (NATA), basing the appraisal on the Government's 5 over-arching objectives of environment, safety, economy, accessibility, and integration.

The assessment of each of these objectives was undertaken using guidance set out in the Department for Transport's (DfT) web-based *Transport Analysis Guidance* (WebTAG).

The section of the existing A26 under consideration is a 7km section between Glarryford and the A44 (Drones Road). The existing route is predominantly rural in nature and passes through an agricultural setting, which is particularly prevalent to the east of the alignment with the whole area actively farmed with a number of working farms present. To the west of the A26, the valley of the River Main runs parallel to the road; further to the west, the Belfast to Londonderry/ Portrush Railway Line also runs roughly parallel to the road. The villages of Glarryford, Clogh Mills and Dunloy surround the road.

The section of the A26 under consideration is a single 2-way carriageway. For the majority of the route it is derestricted and therefore subject to a speed limit of 60mph (100kph). However, a short section around the A26/ B94 (Drumadoon Road) junction is subject to a 50mph speed limit. In sections, both horizontally and vertically, the existing route is below standard for a design speed of 100kph.

There are currently five junctions with side roads throughout the study area. All are priority junctions.

There are six existing structures within the study area on the existing road. Three structures are river crossings and three are small culvert structures. All structures are in a reasonable condition. There are a limited number of utility services running along the existing road corridor, including electricity, water and telecommunications.

The geology within the study area is diverse. In general, to the west of the existing A26 the geology comprises largely alluvial and peaty soils with discrete areas of sand and gravels. The ground conditions are considered poor in this area and substantial ground improvement would be required. To the east of the existing A26, the ground conditions are markedly different. This ground comprises over-consolidated, lodgement glacial till. This is good quality earthworks material which would be suitable for road construction.

There are some significant environmental constraints associated with the study corridor. In ecological terms, there are two Areas of Specific Scientific Interest (ASSIs) to the west of the existing A26. These form part of the River Main Special Area for Conservation (SAC). This is a European designated site for nature conservation. There are also a range of protected species associated with the River Main valley. The river valley also provides for a substantial 1:100 year floodplain, which lies to the west of the existing A26 route.

There are limited historic features present within the study area. The most notable being Drumadoon House, which is a listed building.

A traffic capacity assessment was carried out for the existing A26 which determined the base (2006) operational performance of the road was 88% of its capacity, based upon congestion reference flow (CRF). Future year assessments showed operational perfomances of 96% and 116% of capacity for the forecast years of 2012 (notional year of opening) and 2027 (design year), respectively. It is therefore concluded that a single carriageway will suffer significant congestion within the next decade if no route improvement is implemented.

Early consultation was undertaken during Stage 1 in the form of an Information Day. The format of the consultation was an exhibition which was staffed by the design team (Arup and Roads Service). The

exhibition was aimed at informing the public about the study, advising of the extent of the study area, providing information relating to the known engineering and environmental constraints and setting a programme for the study. Attendance was in excess of 200 members of the public and good feedback was received both during and post-event.

Twelve potential corridors were developed during the Stage 1 study. These comprised a mixture of central and off-line corridors, with corridors to the east, to the west and more central to the existing A26 route. These corridors are presented on drawing A26-HWY-005 (Appendix A).

Six corridors were rejected after a broad assessment, based upon impact upon key constraints and known features, and six corridors were taken forward for further, more detailed Stage 1 assessment as shown on drawing A26-HWY-006 (Appendix A) and as follows:

- Corridor 1 – Western 2. This corridor maximises the use of the existing A26 corridor to a point just south of the Frosses Trees. At this point, it moves off-line to the west, crossing the River Main and its associated floodplain. The corridor crosses the B93 (Killagan Road) immediately to the west of the Logan's retail facility from where it closely follows the Drumadoon watercourse before tying back into the existing A26 at the junction with the A44 (Drones Road). This corridor, together with Corridors 5 and 6, benefits from minimising traffic disruption during construction.
- Corridor 2 – Western 5. This corridor maximises the use of the existing A26 corridor to a point just north of the junction with Lisnasoo Road. At this point, it moves off-line to the west passing behind several residential properties along the line of the existing A26 until it passes immediately to the west of the Logan's retail facility. From here it closely follows the northern section of Corridor Option 1 to the tie-in to the existing A26 at the junction with the A44 (Drones Road).
- Corridor 3 – Western 6. This corridor maximises the use of the existing A26 corridor to a point just north of the junction with the B93 (Killagan Road). At this point the corridor moves off-line to the west, behind the residential properties and follows the northern section of Corridor Option 1 to the tie-in to the existing A26 at the junction with the A44 (Drones Road).
- Corridor 4 – Central. This corridor maximises the use of the existing A26 corridor for the majority of its length except for a distance of approximately 1 kilometre in the vicinity of the existing Cloghmills Water crossing, where the corridor deviates off-line to the west. The corridor rejoins the existing corridor south of the junction with Drumadoon Road and follows it to the northern end at the junction with the A44 (Drones Road). This corridor benefits from minimising land-take.
- Corridor 5 – Eastern 1. This corridor maximises the use of the existing A26 corridor to a point just south of the Frosses Trees. At this point, it moves off-line to the east behind residential properties and farm businesses, closely following the Old Frosses Road and Cloghmills Water, before tying back into the existing A26 at the junction with the A44 (Drones Road). This corridor, together with Corridors 1 and 6, benefits from minimising traffic disruption during construction.
- Corridor 6 – East-West. This corridor is common with Corridor Option 5 to a point just north of the Cloghmills Water crossing where it deviates to the northwest and diagonally crosses the existing A26 immediately north of the junction with the B93 (Killagan Road). From this point, the corridor continues west and follows the northern section of Corridor Option 1 to the tie-in with the existing A26 at the junction with the A44 (Drones Road). This corridor, together with Corridors 1 and 5, benefits from minimising traffic disruption during construction.

The assessment of the six corridors was undertaken against the Government's five over-arching objectives of environment, safety, economy, accessibility, and integration, as well as engineering and traffic issues.

All the corridors could be designed in accordance with DMRB design standards for a 120kph design speed. However, Corridor 1 (and to a lesser extent Corridor 2) would require significant ground improvement works to stabilise poor ground. In addition, both Corridors 1 and 2 would require significant import of fill material to build substantial lengths of embankments through the River Main floodplain. Corridors 5 and 6 would largely pass through good engineering ground and a cut to fill balance could be achieved, minimising the need for imported material. The best performing corridor in terms of engineering impact was Corridor 5.

All corridors performed satisfactorily in terms of traffic capacity.

Substantial negative environmental impacts were assessed for Corridor 1 with the potential impacts upon biodiversity, water quality, visual intrusion and noise. One of the major impacts were those associated with the Frosses and Dunloy Bogs which are both nationally protected Areas of Special Scientific Interest (ASSI) whilst together form part of a European protected Special Area of Conservation (SAC). Under European legislation, any proposed corridor in the vicinity of these protected sites would have to demonstrate no adverse environmental effects. Corridors 5 and 6 also performed poorly in terms of impact on the environment, particularly in relation to biodiversity. The best performing corridors in terms of environmental impact were Corridors 2, 3 and 4.

The existing A26 has suffered 39 personal injury accidents between 2002 and 2004. All the proposed corridors would be expected to significantly improve safety performance in relation to the existing route.

A summary of the economic measures for each corridor is provided in table 0.1.

Table 0.1: Summary of Economic Criteria

Cost Item	Corridor 1: Western 2	Corridor 2: Western 5	Corridor 3: Western 6	Corridor 4: Central	Corridor 5: Eastern 1	Corridor 6: East-West
Cost Estimate (2005Q1)	£54.3M	£52.1M	£51.6M	£48.7M	£46.1M	£52.1M
Net Present Value (NPV) (2002)	£35.7M	£44.5M	£43.6M	£48.2M	£43.8M	£42.4M
Benefit to Cost Ratio (BCR)	1.90	2.18	2.19	2.39	2.30	2.08

The range of cost estimates for the corridors varies from £46.1 million to £54.3 million, with the least expensive and most expensive being Corridors 5 and 1, respectively.

In terms of economic performance, over a 60 year period the best performing corridor is Corridor 4 with a Benefit to Cost Ratio (BCR) of 2.39 and a Net Present Value (NPV) of over £48.2 million. However, there is little difference in economic performance between the corridors.

Accessibility was not assessed for this stage 1 assessment.

In terms of integration, all the corridors would all contravene land use policy and other Government policies to some extent. However, Corridor 1 is the worst performing as it would, most significantly, contravene policies concerning development on peatland; development on floodplain; and impact upon conservation. Corridors 5 and 6 would potentially contravene policies concerning development on agricultural land and ecology. Corridors 3 and 4 would be likely to have the least significant impact under the integration objective.

Based upon the more detailed assessment of the six corridors as part of this Stage 1 process, we recommend that Corridor 1 be rejected because it performed the worst in three of the five NATA objectives: environment, economy and integration.

There is considered to be insufficient differentiation between the five remaining corridors to justify the rejection of any further corridors at this stage. It is therefore recommended that Corridors 2, 3, 4, 5 and 6 are carried forward into the Stage 2 Assessment process.

On this basis, these five Preferred Corridors to be taken forward into Stage 2 will be presented to the public at a 'Route Improvement Corridor Options Public Consultation Event'. For the purpose of this Event and for the subsequent Stage 2 Assessment, the five corridor options shall be re-named as follows:

- Corridor 2 will be re-named as **Option 1**;
- Corridor 3 will be re-named as **Option 2**;
- Corridor 4 will be re-named as **Option 3**;
- Corridor 5 will be re-named as **Option 4**;

- Corridor 6 will be re-named as **Option 5**;

These five Preferred Options are presented on drawing A26-HWY-009 (Appendix A).

The views and comments received from the public during this Public Consultation Event and within the associated consultation period will be considered in the Stage 2 Assessment and will inform the decision on the 'Preferred Route' option.

1 Introduction

1.1 Purpose of the Report

In March 2005, the *Regional Strategic Transport Network Transport Plan 2015* (RSTN TP) was published. The Plan defined the A26 between Glarryford and the A44 Drones Road junction as forming part of the Northern Key Transport Corridor (KTC) connecting Belfast and Londonderry via Coleraine. The RSTN TP included the 'A26 Glarryford - A44 Junction (upgrade to dual-carriageway)' in the 5 to 10-year Forward Planning Schedule.

This report is a stage 1 scheme assessment for the scheme. It provides a 'corridor' appraisal for the route. The study broadly aims to identify the environmental, engineering, economic, and traffic advantages, disadvantages and constraints associated with broadly defined improvement strategies. The study has been undertaken in accordance with the *Design Manual for Roads and Bridges* (DMRB), *TD 37/93 – Scheme Assessment Reporting*, and the *New Approach to Appraisal* (NATA), which is the recommended basis for the appraisal of road schemes throughout the UK. Throughout the NATA process, the Government's 5 objectives are central:

- environment,
- safety,
- economy,
- accessibility, and
- integration.

The assessment of each of these objectives has been undertaken using guidance set out in the Department for Transport's (DfT) web-based *Transport Analysis Guidance* (WebTAG), which is essentially guidance as to how each objective should be assessed. It sets the context for the assessment process and provides a structured assessment framework to enable comparison between competing corridors.

1.2 Proposal and Study Area

The route to be assessed is a single carriageway and forms part of the main road linking Ballymena to Ballymoney. The highway carries traffic volumes in the region of 18,000 vehicles per day, and suffers traffic congestion on a daily basis. This section of highway has a relatively high number of side roads and residential access roads which are directly served from the main carriageway. The road also suffers from a lack of safe overtaking opportunities. These two factors have resulted in this section of highway having a relatively poor safety record, and the lack of overtaking opportunities is a cause of driver frustration as vehicles regularly become stuck behind slow-moving vehicles.

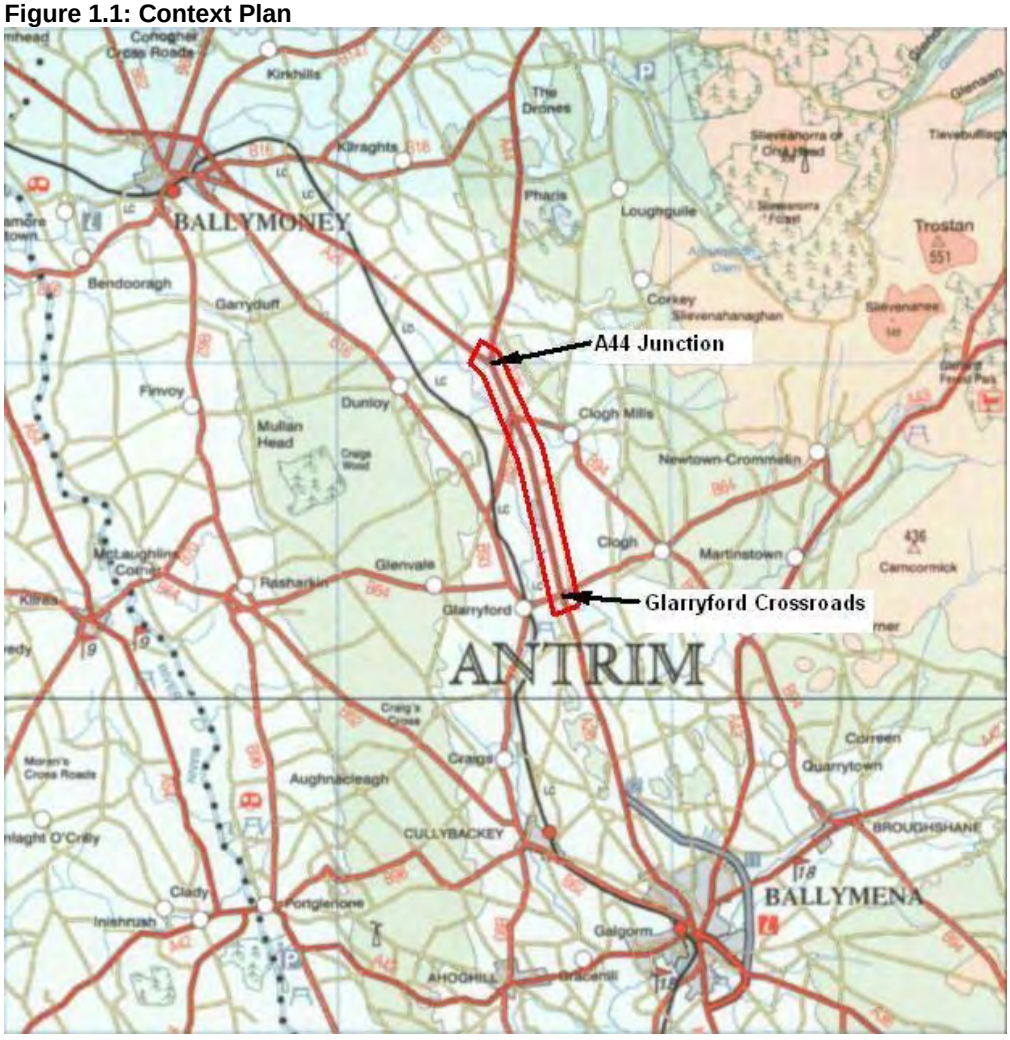
The proposed scheme comprises upgrading the A26 route between Glarryford and the A44 Drones Road junction from a single carriageway to a dual carriageway over a length of approximately 7km. The scheme will also include upgrading of key junctions.

To the southern end of the scheme the existing A26 is already a dual carriageway.

To the north of the scheme, immediately north of the A44 Drones Road junction, the A26 is a single carriageway for approximately 1.5km until it reaches the Dunloy Crossroads. This junction has recently benefited from a major improvement to both layout and standards.

A context plan can be seen overleaf in Figure 1.1.

Figure 1.1: Context Plan



1.3 Scope of the Assessment

The scheme assessment is being carried out in accordance with the requirements of the DMRB, specifically TD 37/93, *Scheme Assessment Reporting* and Volume 11 for the environmental assessment. The DMRB is published by Her Majesty's Stationery Office and is applicable in Northern Ireland.

The scheme assessment process typically involves a three stage approach:

- stage 1 assessment is largely a desk based exercise making use of published information and a series of initial site visits and surveys, information collection and review, identification and mapping of constraints and liaison with relevant departments and stakeholders. The preliminary assessment will be conducted at the "broadly defined route corridor" level. The output of stage 1 will normally be the recommendation of a preferred corridor to be taken forward to stage 2.
- stage 2 assessment involves a more detailed assessment including surveys to identify the key effects and factors to be taken into account when selecting and comparing alignments. This requires the application of a formal multi-criteria assessment approach based on the WebTAG methodology endorsed by the Department of Transport (i.e. similar to the former GOMMMS process) to assist in the identification and selection of a preferred alignment corridor. The output of stage 2 will be the preferred alignment corridor.
- stage 3 assessment involves the further design development of the preferred corridor. This stage of assessment requires completion of an environmental impact assessment

and the preparation of an environmental statement in accordance with Part 5, Article 67 of The Roads (Northern Ireland) Order 1993, implementing EC Directive 85/337, as amended by Council Directive 97/11 for the preferred corridor. In addition, the production of draft vesting and direction orders will be required.

This report summarises the results of the ***stage 1 assessment*** for the A26 Dualling – Glarryford to A44 Drones Road scheme.

1.4 Structure of the Report

This stage 1 assessment report comprises 16 chapters, which are summarised as follows:

- Chapter 1, *Introduction*, discusses the purpose, scope and structure of the report;
- Chapter 2, *Existing Engineering Conditions*, considers the existing route conditions in terms of the built environment;
- Chapter 3, *Planning Policy and Legislation*, provides an assessment of the legislative, environmental, and planning policy context, within which the proposed A26 Dualling scheme sits;
- Chapter 4, *Existing Baseline Environmental Conditions,* considers the existing route in terms of the natural environment;
- Chapter 5, *Traffic and Need for the Scheme*, discusses the existing traffic conditions for the A26 and assesses the impact of traffic growth and the need for route improvement;
- Chapter 6, *Consultation*. This chapter summarises the early consultation undertaken with statutory consultees, key stakeholders and the public;
- Chapter 7, *Route Improvement Strategies*, provides an overview of the corridors for dualling the A26. The chapter presents 12 western, central and eastern corridors, and rationalises them down to 6 corridors for more detailed assessment;
- Chapter 8, *Assessment Methodologies*, presents the assessment methodologies adopted for corridor assessment. The section describes the methodologies for assessing the objectives of environment, safety, economy, accessibility and integration;
- Chapter 9, *Corridor 1 – Western 2*, provides a broad assessment of this western corridor;
- Chapters 10 and 11, *Corridor 2 – Western 5 and Corridor 3 – Western 6* provides the results of the broad assessments of these western corridors;
- Chapter 12, *Corridor 4 – Central,* provides a broad assessment of this Central Corridor;
- Chapter 13, *Corridor 5 – Eastern 1*, provides a broad assessment of this eastern off-line corridor;
- Chapters 14, *Corridor 6 – East–West,* provides a broad assessment of this hybrid corridor;
- Chapter 15, *Corridor Comparison*, provides a like-for-like comparison between the corridors, and recommends preferred corridors to be taken forward to stage 2 scheme assessment; and
- Chapter 16, *Summary and Recommendations*, provides a summary of the stage 1 scheme assessment study.

2 Existing Engineering Conditions

2.1 Introduction

This chapter provides a broad engineering assessment of the existing A26 between Glarryford and the A44 Drones Road junction. The assessment considers the following areas:

- description of route;
- review of highway geometry;
- review of existing structures;
- water quality and drainage;
- public/private utility services;
- carriageway lighting;
- road pavement; and
- geology and soils.

For consistency of reporting, and ease of comparison, all route descriptions are provided on a south to north basis.

The setting of the existing A26 is illustrated on the site location plan, in Figure 1.1 in Chapter 1.

Drawing number A26-HWY-001 (Appendix A) is a 1:12,500 scale plan of the existing A26 corridor. It has been annotated to highlight the key engineering constraints and features along the corridor. This drawing is referred to in the following text.

2.2 Route Description

The highway under consideration is the A26 which provides the main highway link between Ballymena and Ballymoney. The section of the A26 under assessment is the 7km section between Glarryford and the junction with the A44 (Drones Road).

The existing route is predominantly rural in nature and passes through an agricultural setting, which is particularly prevalent to the east of the alignment. To the west of the A26, the valley of the River Main runs parallel to the road; further to the west, the Belfast to Londonderry/ Portrush Railway Line also runs roughly parallel to the road.

The A26 runs between the villages of Clogh Mills (to the east and mid way along the scheme) and Dunloy (to the west and located just north of the scheme). However, both villages are located in excess of 1km away from the A26.

At the southern end of the scheme, the existing A26 is currently of dual carriageway standard. This dual carriageway arrangement provides direct, all movement access to all properties that front onto the road. This is achieved through utilising a wide central reserve and providing right-turn gaps (cross-overs). This dual carriageway narrows down to single-carriageway standard on the approach to the at-grade, staggered cross-road junction with the B64 (Station Road and Springmount Road), and is of single carriageway standard at the point of the junction. This junction is an uncontrolled, staggered, priority junction, which utilises a wide central reserve to provide protected right-turn lanes for A26 traffic turning off, and storage for right-turning vehicles turning out of the side roads.

Heading north, the continues as a traditional single carriageway cross-section. The first 1.5km of the road can be characterised to the east as agricultural and to the west, a mixture of agricultural and scrub land. The topography is fairly hilly on both sides of the A26, but is more extreme on the east. Over the first 1.5km of the route, to the east, there are currently three isolated private accesses (set back from the A26 by between 25 and 30m) and a petrol filling station. To the west of the A26, there are no private residential accesses.

Continuing north, the A26 passes through the first of two engineering and environmental features known as the Frosses Trees. This is the first of two sections of Scots Pine trees along the route which were planted in 1839 by Charles Lanyon. The trees lie immediately adjacent to, and on both sides of, the road to stabilise its foundation as it passed over two sections of unstable ground comprising peat and bog land. The first, and largest, section of the Frosses Trees is approximately 0.5km in length. Mid way along this first section of Frosses Trees is a single residential dwelling to the east and it has a dedicated access in the middle of the trees. This dwelling is set back from the main carriageway by approximately 54m. On both sides of the A26, through this section, the ground comprises bog land and of poor agricultural quality. The bog to the west of the A26 in this region is an environmentally protected site, classified as an Area of Specific Scientific Interest (ASSI), and is also a designated Special Area of Conservation (SAC).

Travelling further north, the A26 undertakes a relatively sharp right/ left 'S' bend, where a further residential access is provided to the east. The property served by this access is set back from the A26 by approximately 80m. The road then continues and passes through the second, and slightly smaller, section of Frosses Trees. Through this section, the quality of the land and the topography of the surrounding countryside is markedly different on either side of the road. To the east is good quality agricultural and farm land. It is characterised by a series of quite steep-sided small hills. On the western side of the A26, the topography is virtually flat, and forms the flood plain for the River Main. The quality of land to the west is relatively poor, in that it is largely peat, and is either left as scrub land or has limited use as grazing.

Immediately to the north of the second Frosses Trees, and on the east side, the Lisnasoo Road forms an uncontrolled, at-grade, priority junction with the A26. This junction benefits from a ghost-island right-turn facility for north-bound A26 right-turning vehicles.

For the next 1.4km to the north of Lisnasoo Road, the A26 has residential properties on both sides. To the east there are two large farms, with a collection of buildings at each site. Both of these farm complexes have their buildings set back from the A26 by approximately 20m. In addition, there are a small number of residential properties which are immediately adjacent to the A26. On the western side, there are two farm complexes both of which have their buildings set back from the carriageway by some 20m, and there is a single residential property on the roadside. The topography to the east continues to be extremely hilly over this section, and to the west there is a small hill, on which both farms are situated. The remainder of the land is flat flood plain as previously described.

Continuing north, the A26 undertakes a shallow left turn as it passes the Molloys Complex, including a petrol filling station (on the west) and the Drumaclea Orange Hall (to the east). The Molloys Complex includes a petrol filling station.

The A26 then carries on towards a junction with the B94 (Drumadoon Road), which joins the A26 on the eastern side via an at-grade, ghost-island, priority junction. Between this point and the Molloys complex there are two residential properties immediately to the east of the A26, and two to the west. One of the properties on the eastern side is the listed building, Drumadoon House, which is located immediately adjacent to the B94 (Drumadoon Road). Drumadoon House operates as a tea room, with access provided from the side road.

Immediately to the north of the A26/B94 (Drumadoon Road) junction, on the western side of the A26 is the Logans retail facility, and immediately north of Logans, on the same side of the road is a further side road junction for the B93 (Killagan Road), which, again is an at-grade, ghost-island priority junction with the A26. Access to the Logans retail facility is provided both directly from the A26, through an informal dropped kerb access, and also from the B93 (Killagan Road), which is a more formal access.

North of the B93 (Killagan Road), the A26 continues for a further 1.4km until it meets the A44 Drones Road. Along this section, on the eastern side of the road, there are two properties and a collection of farm buildings which directly front onto the main road. In addition, there are a further two groups of farm buildings set back from the main road by some 150m (approximately). On the western side, there are three properties which are all positioned directly

adjacent to the main road. The land to the east of the A26 is high quality agricultural farm land, with a hilly topography, and to the west, there is one small hill immediately to the north of the B93 (Killagan Road)/ A26 junction. The remainder of the topography is flat.

The A44, Drones Road, forms a junction with the A26 in the form of an at-grade, ghost-island priority junction. From the A26, the A44 heads east towards Ballycastle.

North of the A44 junction, the A26 continues straight and passes between two residential properties situated opposite each other. Both properties are sited adjacent to the road. The A26 then continues north and passes through the recently improved Dunloy crossroads, which as an at-grade, staggered priority junction crossroads.

2.3 Highway Geometry

2.3.1 Horizontal Alignment

The A26 is currently derestricted, and is therefore subject to the national speed limit of 60mph. In accordance with the *Design Manual for Roads and Bridges (DMRB) TD9/93*, this equates to a design speed of 100kph. The existing alignment has been assessed to this design standard.

Overall, the A26 has a reasonably straight alignment, however there are several areas where the highway is subject to reasonably tight horizontal radii, which are considerably below standard for a 100kph alignment.

From the Glarryford crossroads, heading north, the horizontal alignment of the A26 comprises a right-hand bend with a radius of approximately 1700m. For a design speed of 100kph, this radius would be acceptable with a superelevation of 2.5%. The A26 then continues straight for a distance of approximately 2km when it undertakes a sharp ‘S’ bend, which comprises a right-hand bend of approximately 550m immediately followed by a left-hand bend of the same radius. In accordance with TD9/93, these radii would be one-step below desirable minimum, and would require the application of a 7% superelevation.

The A26 then continues north predominantly via flat radii or straight geometry until it reaches the Molloys facility, where the road undertakes a left-hand bend of approximately 830m radius. In this region the area becomes more urbanised with a number of residential properties and businesses adjacent to the carriageway. In this area there is a speed limit of 50mph imposed upon the A26. The horizontal radius is comfortably within design standards for a 50mph (85kph) design speed.

The road then continues straight ahead, and does not encounter any horizontal curvature of note until it reaches the junction with the A44, Drones Road, where the A26 undertakes a sharp left-hand bend of approximately 280m radius. This radius is effectively 3 steps below desirable minimum for this speed of road, and given its location coinciding with the junction with the A44, is a significant departure from standards.

2.3.2 Vertical Alignment

The existing A26 route between the Glarryford junction and the junction with the B94 (Drumadoon Road) passes through a landscape comprising a series of undulating drumlins. The existing vertical alignment is considered poor through this section, as the road roughly follows the natural topography of the landform.

An initial assessment of the existing vertical alignment has shown the route comprises a number of shallow crest and sag curves. The majority of the route is subject to the national speed limit of 60mph (100kph), and a coarse assessment of the existing vertical curvature of the road suggests it could be up to 3 steps below desirable minimum curvature for a 100kph design speed, which would be a departure from standard.

2.3.3 Existing Junctions

2.3.3.1 Glarryford Crossroads

The Glarryford crossroads is an at-grade, staggered priority junction between the A26 with the B64 (Springmount Road and Station Road). The junction is located at the northern end of the existing dual carriageway section of the A26 between Ballymena and Glarryford, and the

junction utilises the tapering central reserve to provide protected right-turn facilities for vehicles turning right off the A26 onto either side road.

It would appear that, previously, this junction was a crossroads, but at some stage the B64 (Springmount Road) was diverted to the south to provide a degree of separation (stagger) from the B64 (Station Road).

2.3.3.2 Lisnasoo Road Junction

The Lisnasoo Road junction with the A26 comprises an at-grade, ghost-island priority junction. The siting of this junction is on top of a crest curve, and visibility may be an issue. However, at this stage of assessment, it has not been possible to fully assess this issue.

2.3.3.3 B94 (Drumadoon Road) Junction

Opposite the Logans retail facility, and immediately to the north of Drumadoon House, the B94 (Drumadoon Road) forms a junction with the A26. The junction is in the form of an at-grade, ghost-island priority junction.

2.3.3.4 B93 (Killagan Road) Junction

Immediately to the north of Logans retail facility, the B93 (Killagan Road) forms a junction with the A26. The junction is an at-grade, ghost-island priority junction.

2.3.3.5 A44 Drones Road Junction

The A26/ A44 Drones Road junction is an at-grade, ghost-island priority junction. The junction is located on a tight horizontal radius of the A26, of approximately 280m. This radius is considered sub standard.

2.3.3.6 Private Accesses

There are numerous private entrances on both sides of the carriageway, including field entrances. Table 2.1 provides a summary of the number of existing accesses entering onto each side of the road.

Table 2.1: Private Access onto Existing A26

Side of A26	Farm Access	Residential Access	Total
West	37	13	50
East	15	30	45
Total	52	43	95

2.4 Structures

2.4.1 Introduction

The condition of the existing structures along the A26 has been assessed. Principal inspection reports, underwater inspection reports, assessment reports and record drawings relating to the structures were used to establish their condition and suitability for future use. The location of each structure is identified on drawing number A26-HWY-001 (Appendix A).

From inspection of the reports available, it has been determined that the general procedure adopted for load assessment has been to assess the capacity of a given structure in accordance with the relevant issue of *BD21, The Assessment of Highway Bridges and Structures* in order to establish the assessment live loading (ALL). Depending on the volume of the traffic flow and the quality of the road surface, the ALL is some factor K (the reduction factor) of full HA loading. HA loading is the design loading used to represent normal traffic loading and is defined in *BD37/01, Loads for Highway Bridges* as well as BD21.

If the assessed capacity of a structure is 40 tonnes ALL, further assessment may have been carried out if so directed by the appropriate authority, in order to establish an HB rating. HB loading is the design loading used to represent abnormal vehicle unit loading and is defined in BD37/01. According to BD37/01, motorways and trunk roads are normally required to carry 45

units of HB loading. However, 45 units of type HB loading is equivalent to a static vehicle weighing 180 tonnes. This is an onerous design load and it is recognised that many older structures may not have this capacity when assessed.

If 45 units of HB loading can be sustained, no further assessment is generally required. However, if a lower HB rating is achieved, then SV Vehicles can be used to provide a more accurate assessment of the structure's capacity to carry abnormal loads. These are defined in *BD86/04, The Assessment of Highway Bridges and Structures for the Effects of Special Types General Order (STGO) and Special Order (SO) Vehicles*.

2.4.2 Newbridge Bridge (Structure No. 10211)

The documents made available for Newbridge Bridge were:

- *Roads Service Consultancy, Principal Inspection Report*, dated December 2004. (This report notes that archived drawings of this structure exist but these were not made available at this stage);
- *Construction Service, Underwater Bridge Inspection,* dated July 2002.; and
- *JMP Consulting, Report on Assessment of Bridge 10211,* dated January 2005.

Newbridge Bridge (along with Crankill Bridge, below) is the southern-most structure on this section of the A26. It carries the south bound carriageway of the A26 over the River Clogh. It is recorded in the Principal Inspection Report that Newbridge Bridge was originally built in 1900, although Roads Service advise that this might only be an approximate date used to populate the database.

According to the Principal Inspection Report, the bridge is a single span stone masonry arch supported on abutments founded in the river bed with a clear square span of 12.30m and a skew angle of 22°. The deck width is given as 10.9m. According to the JMP Report the width of the deck between the inside faces of the parapet is 10.05m which comprises a 1.42m wide verge/footway to the west, a 7.3m wide two lane carriageway and a 1.33m wide verge/footway to the east. The dimensional discrepancies reported in the different documents are believed to be due to variations in measurement rather than movements in the structure.

According to the principal inspection report, the assessed capacity of the structure is 40 tonnes HA as assessed by Roads Service in August 1986. According to the JMP Report, the assessed capacity of the structure is: HA rating: 40 tonnes ALL; HB rating: 35 units; and SV rating: SV80 (80 tonne vehicle).

The bridge is incapable of carrying SV100 (100 tonne vehicle) and Roads Service have advised that the structure should be added to their bridge strengthening programme. A feasibility study has been completed and strengthening corridors have been received by Roads Service. A start date for the work has not been agreed but it is possible that this work could be carried out in 2007/2008 financial year. Depending on the exact timing of this strengthening work, any future highway proposals incorporating this structure may require either the inclusion of the bridge strengthening, or the application of a departure from standard.

The JMP Report did not assess the parapets although it noted that a visual inspection indicated that they did not conform to current standards.

In the principal inspection of 2004, the bridge was reported to be in good condition with no further work required at that time. However, it did state that consideration should be given to repairing a missing section of the upstream (eastern side) parapet, as at that time there was nothing to prevent a 3m drop to the river bank.

2.4.3 Crankill Bridge (Structure No. 10212)

The documents made available for Crankill Bridge were:

- *Roads Service Consultancy, Principal Inspection Report,* dated July 2005. (This report noted that archived drawings of this structure exist but these were not made available at this stage);

- *Atkins, Principal Inspection Report,* dated July 1994;
- *Atkins, Structural Assessment Report*, dated October 1994;
- *Technotrade Analytical Services, Report on the Examination and Testing of Concrete Samples*, dated December 1994; and
- *Atkins, Assessment Calculations*, dated March 1995.

Crankill Bridge is adjacent to Newbridge Bridge, and it carries the north bound A26 over the River Clogh. It is recorded in the principal inspection report of 2005 that Crankill Bridge was originally built in 1972. It comprises a single span with a deck made up of pre-cast, pre-stressed concrete inverted T-beams with in-situ concrete infill and topping. The deck is supported on abutments which are founded in the river bed.

According to the principal inspection report dated July 2005, the bridge has a square span of 15.06m and a skew angle of 19.5°. The overall width between the inside faces of parapet is given as 15.6m. However, according to the Atkins principal inspection report dated July 1994 the overall square width between the inside faces of the parapets is 14.96m which comprises a 4.66m wide hard shoulder, with no verge, to the west, a 6.84m wide two lane carriageway, a 1.06m wide hard strip and a 2.40m wide stone verge both to the east. The deck is considered to be wide enough to accommodate a two-lane carriageway of 7.3m width with verges on either side. The dimensional discrepancies reported in the different documents are believed to be due to variations in measurement rather than any changes in the structure, possibly the larger dimension was taken at a skew angle.

The Atkins assessment report, dated 1994, states that the bridge deck was found to be adequate to carry full HA live loading in bending and shear at the ultimate limit state. However, there was an anomaly in this report because Table 1 (of the report) showed that the edge beams failed in shear at the supports.

Further problems were reported at serviceability limit state where if it was assumed that the prestressed beams were class 1 members (no tension permitted in the concrete) a load restriction of Group 2FE would need to be applied to the internal beams. This would result in an onerous weight restriction of between 3 and 7.5 tonnes. However, if it was assumed that the prestressed beams were class 2 members (limited tension permitted in the concrete), then 40 tonnes HA loading could be carried satisfactorily by the internal beams. Likewise, if the edge beams were assumed to be class 1 members, they failed under dead loading but if they were assumed to be class 2 members, they were satisfactory for 40 tonnes HA loading, but only if traffic on the deck was limited to four notional lanes (rather than five which could theoretically be fitted into the width).

At ultimate limit state the edge beams can carry only 18 units of HB with HA. For HB in slow lane without HA loading, then the load capacity is 45 units of HB for the internal beams, but still only 18 units of HB for the edge beam on the hard shoulder side.

Serviceability limit state was only satisfactory for the internal and edge beams under 45 units of HB loading when this was placed in the slow lane without any associated HA loadings and assuming that the prestressed beams are class 2 members,.

The above loading assessment from Atkins 1994 report shows that there was a need to enforce some restrictions on the bridge. In particular:

- loading should be kept away from the edge beams which are understrength;
- the width of trafficking should be limited to four notional lanes; and
- a departure from standard should be agreed to relax class 1 prestressed beams to class 2 i.e. to allow tension in the concrete.

The principal inspection carried out by W S Atkins in 1994 noted mapping type cracks in the flanges and T-beams, indicating the possibility of alkali silica reaction. Roads Service has advised that in 1997, the cracks were monitored and initial results concluded that the bridge

was under no distress. However, to date, there is no conclusion on whether alkali silica reaction is present or not.

In 1994, testing of concrete also showed high levels of chlorides in the parapet plinths. In addition, testing of concrete samples from the structure showed that the bridge deck contained carbonated material and evidence of unexpectedly high sulphate content. No records have been identified which would indicate that any remedial work has been carried out.

Any future highway proposals incorporating this structure would require either replacement of the bridge deck, strengthening of the bridge to accommodate the required HA and HB loadings in conjunction with further material testing and any concrete remedial works found to be necessary, or the application of a departure from standard.

According to the principal inspection report dated 2005, the bridge is in good condition and no further work was required at that stage. It did recommend that consideration should be given to investigating the drainage channel and the joints at the bearing shelves behind the abutments, to identify the cause of the abutment staining and leaking water.

However, at this stage, given that Crankill Bridge is at the southern limit of the scheme study area, no further investigation or testing work is proposed.

2.4.4 Drumadoon Bridge (Structure No. 30466)

The documents made available for Drumadoon Bridge were:

- *Roads Service Consultancy, Principal Inspection Report*, dated September 2003;
- *Building Design Partnership / Shoreline Engineering Limited, Underwater Bridge Inspection*, dated June / July 1991;
- Masonry Parapet Assessment Proformas, dated February 2001; and
- Assorted old papers, bridge assessment calculations and photographs including a summary of the Principal Bridge Inspection, dated June 1990.

It is recorded in the principal inspection of 2003, that Drumadoon Bridge was originally built in 1900, although Roads Service advise that this might only be an approximate date used to populate the database.

The structure is a two-span masonry arch structure which carries the A26 single two-lane carriageway over the Cloghmills Water. The bridge is carried on two abutments and a central pier founded in the stream bed and protected by a concrete apron which was constructed in 1996 by the Department of Agriculture.

In the principal inspection of 2003, the clear spans are recorded as 5.56m and 5.55m in length and the deck width is given as 9.92m. In the principal inspection of 1990, the clear spans are recorded as 5.54m and 5.51m in length. In the masonry parapet assessment, the width of deck between the parapets is given as 10.07m which comprises a 1.2m wide footpath to the east, a 1.1m wide verge to the west and a 7.7m wide carriageway. The minor dimensional discrepancies reported in the different documents are believed to be due to variations in measurement rather than movements in the structure. There are reported to be no record drawings of this structure.

In the principal inspection of 2003, the load carrying capacity of this structure is reported to be 40 tonnes HA. This capacity was assessed by Roads Service in March 1986. In June 1990, the bridge was assessed by Roads Service and reported to be able to carry up to 53 units of HB loading. As this is more than 45 units of HB, Roads Service have advised that an SV rating is not required. The structure therefore has sufficient capacity to be incorporated into future proposals without the need for strengthening.

According to the masonry parapet assessment, both parapets fail. The east parapet fails only on end impact criteria, whereas the west parapet, being only 530mm to 650mm high, fails the assessment on geometric and capacity criteria as well.

In the principal inspection of 2003, the bridge is reported to be in good condition with no further work required at that time.

2.4.5 Ballycastle Fork 1 (Structure No. 31487)

The documents made available for Ballycastle Fork 1 were:

- *Roads Service Consultancy, Principal Inspection Report*, dated July 2003. (This report notes that archived drawings of this structure exist but these were not made available at this stage).

According to the principal inspection report, Ballycastle Fork 1 is a corrugated steel pipe structure, 1.48m in diameter. The structure carries the A26 over a stream and has an overall width of 25.0m with a skew angle of 10°. The structure does not have any head walls or parapets and Roads Service have advised that there are no immediate plans to provide them. A corrugated steel safety fence is provided to the west but no vehicle restraint is provided to the east.

This structure has not been assessed as, according to the principal inspection report, it was constructed after 1976 and is therefore not subject to assessment as it was initially designed to meet the 40 tonne loading regulations. *BA55/06, The Assessment of Bridge Substructures and Foundations, Retaining walls and Buried Structures*: clause 3.9 states that: “Corrugated steel buried structures need not be assessed by calculation unless there is evidence of corrosion or deterioration of the corrugated steel or movement of the structure’s profile”. Roads Service have also advised that Ballycastle Fork 1 is excluded from stage 1 and 2 of the assessment programme because it is a corrugated steel structure and it has a span less than 3m with greater than 1m cover. Consequently, SV ratings are not required.

The structure is reported to be in good condition but there is heavy vegetation at both openings. This may reduce the hydraulic capacity of the culvert and ought to be cleared to avoid the risk of blockage. The principal inspection report also recommends that consideration should be given to de-silting this structure. Presumably the concern would be that the hydraulic capacity of the culvert may have been reduced which would increase the probability of flooding.

2.4.6 Ballycastle Fork Bridge 2 (Structure No. 31488)

The documents made available for Ballycastle Fork 2 were:

- *Roads Service Consultancy, Principal Inspection Report*, dated July 2003. (This report notes that archived drawings of this structure exist but these were not made available at this stage).

According to the principal inspection report, Ballycastle Fork 2 is a corrugated steel pipe structure, 1.50m in diameter. The structure carries the A26 over a stream and has an overall width of 25.0m with a skew angle of 27°. The structure does not have any head walls or parapets and Roads Service have advised that there are no immediate plans to provide them. A corrugated steel safety fence is provided to the west but no vehicle restraint is provided to the east.

This structure has not been assessed as, according to the principal inspection report, it was constructed after 1976 and is therefore not subject to assessment as it was initially designed to meet the 40 tonne loading regulations. *BA55/06, The Assessment of Bridge Substructures and Foundations, Retaining walls and Buried Structures*: clause 3.9 states that: “Corrugated steel buried structures need not be assessed by calculation unless there is evidence of corrosion or deterioration of the corrugated steel or movement of the structure’s profile”. Roads Service have also advised that Ballycastle Fork 2 is excluded from stage 1 and 2 of the assessment programme because it is a corrugated steel structure and it has a span less than 3m with greater than 1m cover. Consequently, SV ratings are not required.

The structure is reported to be in good condition but there is heavy vegetation at both openings. This may reduce the hydraulic capacity of the culvert and ought to be cleared to avoid the risk of blockage. The principal inspection report also recommends that consideration should be

given to de-silting this structure. The concern would be that the hydraulic capacity of the culvert may have been reduced which would increase the probability of flooding.

2.4.7 Broughanore Bridge (Structure No. 30467)

The documents made available for Broughanore Bridge were:

- *Roads Service Consultancy, Principal Inspection Report*, dated September 2003;
- Masonry Parapet Assessment Proformas dated August 1996; and
- Assorted old papers, bridge assessment calculations and photographs including a summary of the Principal Bridge Inspection dated June 1990.

It is recorded in the principal inspection of 2003, that Broughanore Bridge was originally built in 1900, although Roads Service advise that this might only be an approximate date used to populate the database.

It is a two-span masonry arch structure which carries the A26 single two-lane carriageway over the Killagan Waters. The bridge is carried on two abutments and a central pier founded in the stream bed and protected by a concrete apron which was constructed in 1995 by the Department of Agriculture Drainage Division. Note that no underwater bridge inspection report was provided for this structure (as was the case for Drumadoon Bridge), although the Principal Inspection of 2003 reports that the aprons and inverts are in good condition.

In the principal inspection of 2003, the clear spans are recorded as 5.6m and 5.6m in length and the deck width was given as 10.85m. In the principal inspection of 1990, the clear spans are recorded as 5.41m and 5.44m in length. In the masonry parapet assessment, the width of deck between the parapets is given as 10.05m which comprises a 1.2m wide verge to the north-east, a 1.1m wide verge to the south-west and a 7.75m wide carriageway. The minor dimensional discrepancies reported in the different documents are believed to be due to variations in measurement rather than movements in the structure. There are reported to be no record drawings of this structure.

In the principal inspection of 2003, the load carrying capacity of this structure is reported to be 40 tonnes HA. This capacity was assessed by Roads Service in June 1990. Also in June 1990, the bridge was further assessed by Roads Service and reported to be able to carry up to 50 units of HB loading. As this is more than 45 units of HB, Roads Service have advised that an SV rating is not required. The structure therefore has sufficient capacity to be incorporated into future proposals without the need for strengthening.

According to the masonry parapet assessment, both parapets fail on end impact criteria and marginally on capacity criteria. The north-east (right hand side) parapet is on average 830mm high and 400mm wide and can contain the 1500kg design vehicle impacting at 20° at 90 km/hr. The south-west (left hand side) parapet is on average 873mm high and 400mm wide and can contain the 1500kg design vehicle impacting at 20° at 94 km/hr. The design speed was taken as 100km/hr, hence the parapets both fail marginally.

In the principal inspection of 2003, the bridge is reported to be in good condition with no further work required at that time.

2.5 Water Quality and Drainage

No records of existing drainage have been obtained for the existing A26 highway within the study area.

Based on observations made during a site walkover, most of the existing highway appears to be drained by over-the-edge drainage, and no positive drainage network appears to be in operation.

Sections drained by road gullies were identified in several locations, including 300m sections either side of the Lisnasoo Road junction, an 850m long section south of the B94 (Drumadoon Road, on the western side on the road only) and a 1700m length between the B94 (Drumadoon Road) and the A44 Drones Road junction. No manholes were observed, except in the centre of

the B94 (Drumadoon Road) junction. It is therefore assumed the gullies either drain into soakaways or out through the embankment slopes. However, no evidence of this was observed.

The existing A26 was observed to pass over 10 separate watercourses, all of which were noted as carrying significant flows at the time of the site visit. The Cloghmills Water has been designated as a 'main watercourse' and is spanned by structure no. 30466, Drumadoon Bridge (see section 2.4.4).

The remainder of the watercourses are carried by a variety of culverts ranging from twin 1800 mm (approx) diameter culverts to small stone square culverts. The culvert sizes did not always appear to reflect the apparent size of the stream. Only one of the watercourses passing under the A26 had the River's Agency designation of 'minor watercourse', but four others were designated 'minor watercourses' immediately downstream of where they passed under the A26. The remaining watercourses were undesignated.

Drawing number A26-HWY-001 illustrates the locations and status of the watercourses within the study area.

2.6 Public/Private Utility Services

A review of utility services has been undertaken for the existing A26 corridor and surrounding area. The search entailed reviewing data supplied by the Roads Service, and this was supplemented by information supplied by the following utility service providers:

- Northern Ireland Electricity (NIE),
- DRD Water Service,
- British Telecom (BT),
- Phoenix Natural Gas, and
- NTL.

The major services identified from the search are shown on drawing number A26-HWY-002, Appendix A.

2.6.1 Northern Ireland Electricity (NIE)

Northern Ireland Electricity has a large amount of existing plant and apparatus in this area. The main features of their equipment are a series of 11kv and 33kv overhead cables running the full length of scheme.

There are two overhead 33kv cable runs. The first cable runs from the Glarryford crossroads (on the western side) parallel to the existing A26 as far as the southern Frosses Trees. At this point the overhead cable crosses to the east of the A26 before crossing back to the western side between the two sets of Frosses Trees. The cables continue parallel alongside the A26 to a point approximately 1km north of Lisnasoo Road, where they cross the A26 once more and follows a north-easterly direction. The second 33kv power line runs east to west and crosses the A26 approximately 0.5km south of Drumadoon House.

There are a series of 11kv overhead cables along the route. There is one main run which runs northwards along the eastern side of the A26 from the Glarryford junction. This run crosses to the western side of the A26 in the region of Drumadoon House. In addition to this longitudinal run, there are several 11kv lines which cross the existing A26 in various locations along the scheme.

2.6.2 DRD Water Service

Water mains are present within the study area. At the southern end of the scheme, a water main runs along the B64 (Station Road and Springmount Road). It connects into a second main which lies along the eastern side of the A26. This main runs parallel to the A26 along the Old Frosses Road until it reaches the junction with Lisnasoo Road. The main then heads west along

Lisnasoo Road until it reaches the A26, at which point it turns north and runs along the verge of the A26 for the remainder of the study corridor.

Other water mains are present along the B94 (Drumadoon Road) and the B93 (Killagan Road).

No details of any foul sewers were made available for the study area.

2.6.3 British Telecom (BT)

BT has a major cable route running along the A26 verge mostly in 4-way ducts carrying at least 2 optical fibre cables and various small copper cables. These optic fibre cables carry high grade and strategically important circuits and stretch the entire length of the scheme from the Glarryford junction to A44 junction.

2.6.4 Phoenix Natural Gas

Preliminary enquiries have indicated that Phoenix Natural Gas does not have any plant or equipment within the study area.

2.6.5 NTL

Preliminary enquiries have indicated that NTL telecommunications do not have any plant or equipment within the study area.

2.7 Traffic Regulation Orders (TRO)

This section of the A26 is generally derestricted and therefore, for the majority of its length, is subject to the national speed limit of 60mph. However, a 50mph speed limit applies (from south to north) between a point some 700m south of the Molloys to a point approximately 400m north of the B93 (Killagan Road) junction. The approximate location of this TRO is illustrated on drawing number A26-HWY-001.

There is a short section of waiting restrictions, where double yellow lines are present outside Drumadoon House and Logans.

A full search of TROs will be undertaken during the stage 2 assessment.

2.8 Carriageway Lighting

There is a short section of road lighting along this section of A26. The lighting approximately coincides with the 50mph speed restricted section of carriageway, as previously described.

2.9 Existing Road Pavement

No assessment of the existing road pavement has been conducted at this stage.

2.10 Geology and Soils

The existing geology and soils information for this scheme is presented on a geotechnical features plan, drawing number A26-GEO-001, which is provided in Appendix B.

The geology of this area is interesting in that it varies significantly on either side of the existing A26.

The existing road approximately follows the eastern edge of the River Main valley bottom. However, this margin is irregular in places with areas of glacial till (drumlins) protruding through the alluvial and peaty valley bottom. Much of the existing alignment is on glacial till, generally avoiding the poorly drained valley bottom.

North of the Glarryford junction the alignment crosses a minor valley before rising to cross an area of glacial till, and then descending to skirt the eastern edge of the Frosses Bog.

Where the A26 crosses the eastern edge of the bog, it is characterised by the two remaining sections of the Frosses Trees, planted to give the road causeway some stability (from the tree roots) as it traverses the poor peaty ground conditions of the bog.

The two sections of Frosses Trees are separated by a slightly elevated section where the road crosses glacial till on the edge of a drumlin.

North of the Frosses Trees, the alignment rises to cross a further area of glacial till before descending to cross a minor valley containing Cloghmills Water.

The section of the alignment from Cloghmills Water to the A44 junction closely follows the boundary between the flat and poorly drained valley bottom to the west, and the undulating drumlin topography to the east.

Just beyond the A44 junction, the A26 crosses the valley of Killagan Water.

3 Planning Policy and Legislation

3.1 Introduction

This chapter provides an overview of the relevant statutory context, including descriptions of key strategic planning policies and guidance that will require consideration during the development of this scheme. The policy provisions of both relevant European and UK (Northern Ireland) legislation and planning guidance have been identified and described accordingly. Further information on relevant planning policies and legislation is provided in Appendix C.

3.2 European Legislation and Directives

European legislation and directives issued by the European Council (EC) affect all member states, including the UK. Where appropriate, the UK transposes the provisions contained under European legislation into national law, to meet its obligations under these agreements.

The primary EC directive concerned with the development of this scheme is the *Environmental Impact Assessment (EIA) Directive 85/337*, as amended by *Council Directive 97/11/EC*. The EC EIA Directive 97/11/EC came into effect on 14 March 1999 and sets out procedures that must be followed for certain types of private and public development which are likely to have significant effects on the environment. This ensures that the 'competent authority' responsible for determining whether a scheme should be granted approval or otherwise has considered to the fullest extent possible the likely environmental effects and measures for their mitigation or minimisation.

EIA is a mandatory requirement for all development listed under Annex I of the EC EIA Directive 97/11/EC. Developments listed under Annex II of the EC EIA Directive 97/11/EC will be subject to EIA if they are likely to have significant effects on the environment and/or are located in an 'environmentally sensitive area'. The provisions of the EC EIA Directive 97/11/EC are implemented under the *Roads (Northern Ireland) Order 1993* (see below).

Other key EC Directives which will require consideration throughout all phases of scheme development include:

- The Conservation of Natural Habitats and Wild Flora and Fauna Directive 92/43/EC;
- The Conservation of Wild Birds Directive 79/409/EC;
- The Freshwater Fisheries Directive 78/659/EC;
- The Water Framework Directive 00/60/EC;
- The Air Quality Framework Directive 99/30/EC;
- Urban Waste Water Treatment Directive 91/271/EC;
- Nitrates Directive 91/676/EC;
- The Groundwater Directive 80/68/EC; and
- The Public Participation Directive 03/35/EC.

3.3 The Roads (Northern Ireland) Order 1993

The *Roads (Northern Ireland) Order 1993* is the principal statutory instrument in Northern Ireland which regulates and controls the development of roads. This Order contains provisions under Article 67 which implement the EC EIA Directive 85/337, as amended by 97/11/EC.

The EIA process for this scheme will be conducted in accordance with the procedures in *DMRB Volume 11: Environmental Assessment (refer to TD 37/93 Stage 1, 2 and 3 Scheme Assessment)* and the provisions under the *Roads (Environmental Impact Assessment) Regulations (Northern Ireland) 1999*, and *Development Control Advice Note 10 (DCAN 10) Environmental Impact Assessment (DOE Planning Service, 1999)*. The assessment will be further assessed against the environmental criteria set in the UK Government's Transport Analysis Guidance (WebTag).

Other relevant statutes applicable to the scheme which may require environmental approvals and licences to be obtained during both during construction and operation include:

- *The Roads (Environmental Impact Assessment) Regulations (Northern Ireland) 1999;*
- *The Water Act (Northern Ireland) 1999;*
- *The Drainage (Northern Ireland) Order 1973 as amended by the Drainage (EIA) Regulations (Northern Ireland) 2001;*
- *Drainage (Environmental Impact Assessment) Regulations (Northern Ireland) 2006;*
- *The Groundwater Regulations (Northern Ireland) 1998;*
- *The Pollution Prevention and Control Regulations (Northern Ireland) 2003;*
- *Environmental Impact Assessment (Uncultivated Land and Semi-Natural Areas) Regulations (Northern Ireland) Order 2001;*
- *Agricultural Land (Removal of Surface Soil) Act 1953;*
- *The Environment (Northern Ireland) Order 2002;*
- *Fisheries Act (Northern Ireland) 1996 as amended;*
- *The Historic Monuments and Archaeological Objects (Northern Ireland) Order 1995;*
- *The Clean Air (Northern Ireland) Order 1981;*
- *The Amenity Lands Act (Northern Ireland) 1965;*
- *The Nature Conservation and Amenity Lands (Northern Ireland) Order 1985 (as amended 1989);*
- *The Wildlife (Northern Ireland) Order 1985; and*
- *The Public Health Act 1878.*

3.4 Relevant Planning Policies and Guidance

There are a number of National and Regional strategies and guidance in Northern Ireland containing various frameworks and provisions to guide and facilitate future development whilst achieving a balance with economic benefits and environmental protection. Key policies and strategy documents to be considered as part of the A26 scheme proposals include but are not necessarily limited to:

- *Shaping Our Future: The Regional Development Strategy for Northern Ireland 2025;*
- *A Planning Strategy for Rural Northern Ireland;*
- *Draft Northern Area Plan 2010-2016;*
- *The Antrim, Ballymena and Larne Area Plan 2016;*
- *Regional Transport Strategy 2002-2012 (RTS);*
- *Regional Strategic Transport Network Transport Plan 2015 (RSTN);*
- *Draft Sub-Regional Transport Plan 2015 (SRTP);*
- *Development Control Advice Note 10 (DCAN10) Environmental Impact Assessment – NI Planning Service 1999;*
- *Northern Ireland Air Quality Policy Guidance;*
- *Northern Ireland Biodiversity Strategy (NIBG);*
- *Northern Ireland Biodiversity Implementation Plan 2005 -2008;*
- *The Conservation Peatland Policy 1993;*
- *Northern Ireland Habitat & Species Action Plans;* and

- *Northern Ireland River Conservation Strategy.*

3.5 Relevant Northern Ireland Planning Policy Statements

The relevant planning policy statements (PPS) applicable to this scheme are listed below. These PPS's establish the Government's guidance on the use and planning of land for all forms of development including roads, particularly on key issues such as sustainability, nature conservation and sustainable transport, heritage, countryside management and flooding.

A more detailed assessment will be carried out to determine the scheme's compliance with the relevant provisions contained under each of the PPSs listed below. This assessment will be conducted as part of the stage 2 scheme assessment.

Further information on the PPSs listed below is provided in Appendix C:

- *PPS1 General Principles (DOE March 1998);*
- *PPS2 Nature Conservation (DOE June 1997);*
- *PPS3 Access, Movement and Parking (DOE Feb 1995);*
- *PPS6 Planning, Archaeology & Built Heritage (DOE March 1999);*
- *PPS6 Addendum Areas of Townscape Character (DOE August 2005);*
- *PPS11 Planning and Waste Management (DOE December 2002);*
- *PPS13 Transportation and Land Use (DRD February 2005);*
- *PPS14 Draft Sustainable Development in the Countryside (DRD March 2006); and*
- *PPS15 Planning and Flood Risk (DOE June 2006).*

4 Existing 'Baseline' Environmental Conditions

4.1 Introduction

4.1.1 Overview

This chapter describes the existing environmental baseline conditions within and, where appropriate, peripheral to the study area.

The environmental baseline conditions were established by a systematic review of available published data and information, site visits and preliminary field surveys in the areas of ecology, noise and landscape. The principal document sources consulted included:

- *Draft Northern Area Plan 2016 (DOE);*
- *Antrim Development Plan 1984-2001 (DOE);*
- *Ballymena Area Plan 1986-2001 (DOE);*
- *Northern Ireland Local Air Quality Management Policy Guidance;*
- *Air Quality in Northern Ireland Report 2004;*
- *Ballymena Air Quality Report and Ballymoney Air Quality Progress Report 2005;*
- *Northern Ireland Biodiversity Strategy 2002 (NIBG);*
- *Northern Ireland Biodiversity Implementation Strategy;*
- *Relevant Met Office data;*
- *EHS Monuments and Building Record;*
- *EHS Waterbody Report for River Clogh, Cloghmills Water and the River Main;*
- *Northern Ireland Habitat and Species Action Plans;*
- *The Conservation Peatland Policy 1993;*
- *Northern Ireland Landscape Character Assessment 2000 (EHS); and*
- *EHS Natural Heritage and Designated Areas Website (www.ehsni.gov.uk).*

Concurrently, a number of key stakeholders (including representatives from relevant Government agencies and local councils) were consulted to obtain their views and heighten the study team's understanding of the key physical conditions and attributes situated within the study area that would need to be addressed as part of the stage 1 environmental assessment work.

The characterisation of baseline conditions addressed the following environmental topics:

- Noise,
- Air quality,
- Greenhouse gases,
- Landscape,
- Biodiversity,
- Cultural heritage,
- Water environment,
- Physical Fitness,
- Journey Ambience, and
- Land use.

4.1.2 Study Area

The eastern and western extents of the study area were defined largely due to the nature of the environmental or engineering aspects being investigated. These are illustrated in figure 1.1, in chapter 1. The study area comprises land from two local government districts: Ballymena (south) and Ballymoney (north). Key attributes of the study area include:

- the River Main, its associated tributaries and extensive areas of floodplain, which form the western part of the study area;
- the Belfast to Londonderry/ Portrush Railway Line which runs in a predominantly north-south direction, and closely parallels the existing B93 (Killagan Road) traffic route for approximately 6.5km along the western fringe of the study area;
- the Main Valley Bogs Special Area of Conservation (SAC) which is a European protected site comprising, in part, the Frosses Bog (a nationally protected site) and other areas of bogland which dominate the western part of the study area;
- multiple areas of ecological value and habitat interest which support a range of European and UK protected flora and fauna species;
- two tree-lined sections of the existing A26 experience overhanging trees (named the Frosses Trees) and are a well known landmark for both locals and tourists. These form part of the Northern Ireland Tourism Campaign;
- areas of poorly drained, variable soft or compressible soils, with waterlogging, and erosion hazards across the River Main floodplain;
- listed buildings and known sites of archaeological interest dispersed throughout the study area;
- high quality agricultural land to the east of the existing A26;
- the village of Glarryford and townships of Cloghmills and Dunloy which are located outside of the study area; and
- a number of commercial premises and outlets operate from within the study area.

4.2 Noise and Vibration

The existing noise environment within the study area was assessed as rural in character. The principal noise sources include airborne noise generated by road-based transport (i.e. motor vehicle movements and the application of compression brakes by heavy vehicles) travelling on the existing A26 and local road network, intermittent trains pass-by along the Belfast to Londonderry / Portrush Railway Line, quarrying activities, ground-based agricultural operations using specialised farming equipment and machinery, retail and commercial activities at the shopping complex in the vicinity of the A26/ B94 (Drumadoon Road) junction, and various domestic activities at each residential property located throughout the study area.

The following potentially noise sensitive receptors are located within the study area:

- scattered farmhouses and dwellings across the River Main floodplain and to the east of the existing A26;
- residential properties with direct access or frontage with the existing A26;
- Drumadoon House, a listed building; and
- the village of Glarryford situated in the south-western quadrant of the study area which comprises a small cluster of residential dwellings.

The majority of residential properties front onto the local roads including the A26, and the side roads of the B93 (Killagan Road) and the B94 (Drumadoon Road). The residential properties located either side of the existing A26 (generally, but not exclusively, set back short distances from the roadway) are exposed to high levels of road traffic noise. These noise levels are likely to be exacerbated during peak travel times and school or public holiday periods.

The residential properties situated adjacent to the side roads of the B93 (Killagan Road) and the B94 (Drumadoon Road) would be subject to relatively low levels of road traffic noise based on the lightly trafficked nature of the local roads and level of natural screening provided by the intervening drumlin topography.

The calculation and prediction of road traffic noise in the UK is currently based on the $L_{A10,18h}$ index as specified in the *Calculation of Road Traffic Noise (CRTN) (DOT, 1988).* This represents the "A-weighted" noise level exceeded for 10% of the time between 6.00am and midnight on an average weekday. For this study, a preliminary ambient noise survey was undertaken during the daytime hours of Thursday, 24 August 2006. The results obtained during this survey were used to conduct some preliminary modelling of the existing noise conditions based on the number of noise sensitive receptors located within 0 - 100m, 100m - 200m and 200m - 300m distance bands of the existing A26. The results of this preliminary modelling were as follows:

- 33 residential dwellings are located within the 0 - 100m distance band, experiencing 74-60 dB(A);
- 22 residential dwellings are located within the 100m - 200m distance band, experiencing 60-56 dB(A); and
- 12 residential dwellings are located within the 200m - 300m distance band, experiencing 56-53 dB(A).

These findings were based on predicted 2027 traffic flows where the minimum distance was assumed to be 10m from the road edge.

The level of airborne noise is dependent on the distance between the road and the affected receiver, the speed and type of motor vehicle, the road pavement conditions and geometry. Airborne noise is generally reduced by shielding the affected receivers from the road and lateral noise transmission paths. This can be achieved by using earth bunds, noise barriers, increasing the distance between the road and the affected receivers by careful consideration of the horizontal alignment or by applying absorbent road surfaces to reduce the number of properties where the 68 $L_{A10,18hr}$ noise insulation criterion is exceeded.

4.3 Air Quality

4.3.1 Baseline Conditions

Local air quality and the dispersion of airborne pollutants is influenced by a number of meteorological (i.e. microclimate and temperature inversions), topographical and land use development factors. Key traffic and land use development factors affecting local air quality are attributed to:

- composition of traffic;
- average speed of traffic;
- time of travel;
- distance from the road to receptor;
- projected improvements in vehicle and fuel technologies which may reduce the volume of air pollutants emitted per kilometre; and
- height, density and type of development.

Existing local air quality was generally assessed to be good, reflecting the countryside nature of the locality and the absence of major industry or activities that involve the emission of large or continuous volumes of pollutants into the atmosphere. In rural areas, emissions from motor vehicles tend to be the dominant source of air pollution, although the scale of emissions and the level of impact is substantially less than those likely to be experienced in an urban environment. The principal sources of air emissions within the study area are likely to be attributable to:

- combustion of fuels in motor vehicle engines;

- car maintenance activities, including refuelling activities at the two existing petrol filling stations located along the eastern side of the existing A26;
- motor vehicle traffic travelling along the existing A26 and on the local road network;
- brake and tyre wear from motor vehicle traffic;
- quarrying activities being undertaken in the far western part of the study area;
- heating and cooling systems in retail or commercial outlets and residential dwellings; and
- operation of ground-based farming equipment and machinery.

As part of its commitment to address air quality issues, the UK Government developed an air quality strategy (AQS) for England, Scotland, Wales and Northern Ireland in 2000. The AQS contains a series of air quality objectives which set concentration limits for a range of airborne pollutants. These limits are aligned with the requirements of the *EU Air Quality Framework Directive 99/30/EC.* The principal airborne pollutants identified as being of most concern by the AQS and European legislation and attributed to road traffic emissions leading to poor air quality are considered to be:

- carbon monoxide (CO);
- oxides of nitrogen (NOx), i.e. comprising nitric oxide (NO) and nitrogen dioxide (NO_2);
- sulphur dioxide (SO_2);
- volatile organic compounds (VOC); and
- fine particulate matter (PM_{10}).

The air quality objectives contained in *Air Quality Regulations (Northern Ireland) 2003* provide the statutory basis for the system of local air quality management (LAQM). The LAQM system is designed to ensure that all local authorities review air quality in their administration areas and ensure that all the targets set under the AQS are met. A review carried out on both Ballymena and Ballymoney Borough Councils confirmed that no air quality management areas have been declared within the study area.

There are approximately 55 residential dwellings located within 200m of the existing A26.

4.3.2 Meteorological Conditions

Metrological data was obtained from the nearest Met Office recording station located at Ballypatrick Forest, Co. Antrim, approximately 35km to the north-east of the study area. Data records covering the period between 1996 and 2005 were obtained to profile the local climatic conditions as follows.

4.3.2.1 Temperature

The mean annual temperature between 1996 and 2005 was 9.2°C. The highest temperatures were recorded during July, with an absolute maximum temperature of 26.4°C recorded. The annual mean daily maximum temperature recorded was 12.0°C. The lowest temperature was -5.5°C which was recorded during March. The annual mean daily minimum temperature recorded was 6.5°C.

4.3.2.2 Rainfall

The annual average precipitation level recorded was 1230mm, with the wettest month being December with an average of 299.8mm of rainfall. Both the driest month and wettest day were recorded in September, with 21.5mm of rainfall during one month in one year and 55.6mm of rain recorded during a single day in September in another year.

4.3.2.3 Wind Direction

The prevailing annual wind direction was recorded as being predominantly from the south and south-west, with a large percentage also from the north-west. Autumn and winter winds tend to be dominated by southerlies and south-westerlies whilst in spring and summer the wind profiles are dominated initially from the south-east and then the north-west respectively.

4.3.2.4 Frosts

Frosts generally occur during the winter and early spring. The area received 18.9 days of air frost, mainly during December, January and February. Ground frosts occurred for 70.4 days, again mainly during December, January and February.

4.4 Greenhouse Gases

There is a broad scientific agreement that greenhouse gas emissions as a result of human activity are having a discernible effect on the earth's climate, with potentially significant effects on global temperatures and weather patterns. Commonly known as the global warming phenomenon, it is largely attributed to the continued and rapid rise in CO_2 levels in the atmosphere. If fossil fuels continue to be the dominant energy source and carbon emissions are not contained then the severity of impacts associated with global warming will more than likely increase.

Greenhouse gases and CO_2 tend to linger in the atmosphere for long periods of time and due to the gradual heat exchange between the earth's ocean and atmosphere the effects of increased levels of solar radiation and higher global temperatures are likely to be felt for many years to come. Key adverse impacts associated with the continued emission of greenhouse gases and CO_2 include:

- increased frequency and severity of extreme weather events such as tropical storms, droughts, floods and bushfires;
- increased average global temperatures contributing to the melting of the polar ice caps, glacial ice sheets and raising of sea levels resulting in the mass inundation of low-lying coastal areas;
- loss and destruction of natural ecosystems;
- increased stress and pressures on agricultural regions and water resources;
- population displacements;
- additional costs of water management, agriculture and forestry; and
- rising costs of natural disasters.

A *Greenhouse Gas Inventory Report* was prepared by AEA Technology for England, Scotland, Wales and Northern Ireland and submitted in 2005 to various UK Government departments, including the Northern Ireland Department of Environment. It contains a greenhouse gas inventory for Northern Ireland for the period between 1990 and 2003. In 2003, approximately 27.1% of total CO_2 emissions in Northern Ireland were attributed to road transport which represented 3.6% of the UK total, although Northern Ireland's population accounts for only 2.9% of the UK's total population. Levels of CO_2 emissions have risen by 34.7% between 1990 and 2003 compared with an 8.2% increase in the UK overall.

During this time, a number of strategies have been developed to reduce the level of CO_2 emissions, including reducing fuel consumption in motorized transport, improving the technical and economic efficiency of operation of the road network and traffic management and encouraging the development of more sustainable transport. CO_2 emissions can be reduced by technologies that result in improved fuel consumption, better vehicle maintenance, or a reduction in traffic levels.

4.5 Landscape and Land Use

There are no statutorily protected landscape sites such as areas of outstanding natural beauty located within or peripheral to the study area.

The *Northern Ireland Landscape Character Assessment (NILCA) 2000* divides the province into a series of discrete geographical units or landscape character areas (LCAs). These LCAs, determined through a synthesis of various elements such as landform and geology, vegetation

and habitat, cultural heritage, land use, water features and scenic qualities, are shown on drawing numbers A26-ENV-001 to 004 (Appendix D).

The study area principally comprises land within LCA 59: Cullybackey and Clogh Mills Drumlins, which is characterised by undulating drumlins and a lowland river valley, wedged between LCA 58: Long Mountain Ridge to the west and land that rises steadily towards LCAs 117 and 118: the Garron Plateau to the east.

The predominant landscape influence in the study area is the River Main and its valley floor character. The River Main meanders through the study area in a series of shallow bends and gentle straight glides forming a distinctive feature in the landscape. It has created a shallow valley floor comprising lowland raised bogs, floodplain fen, heaths and both rough improved and unimproved pasture. The floodplain is framed on both sides by gently to moderately undulating drumlin topography, ridges and hill crests. Low lying areas across the floodplain are susceptible to periodic inundation during flood events and high flow conditions in the river.

The River Main floodplain is characterised by open, low-lying farmland which is incised by a diffuse network of natural and artificial drainage ditches. The settlement pattern ranges from a thin, lineal, well-spaced distribution of farmhouses along both sides of the existing A26 corridor, to isolated farmhouses scattered across the floodplain areas and a series of small clusters such as Glarryford and at the Logans retail facility. Vegetation cover across the River Main floodplain is limited to small and isolated blocks of mature and regenerating woodland at Ballyhutherland and Laytown (located in the central part of the floodplain), and a thin riparian belt straddling, in part, both banks of the river, and patches of low level shrubs. Clumps of mature trees are typically found in and around several farmsteads throughout the study area. Overall, the extent of woodland cover in the study area represents less than 2% of the land use. Ridge and hill crests located on elevated ground both to the east and west of the floodplain are either open-topped or crowned with small clumps of deciduous woodland.

The existing A26 passes through the study area in a predominantly northwest to southeast direction along the eastern edge of the floodplain. It affords travellers views of the local landscape. These views are filtered by intervening landform, woodland blocks, and roadside developments. A network of local roads and private property accesses connect to the A26 and delineate the landscape. The Frosses Bog ASSI is situated immediately to the east of the A26 in the southern part of the study area. In the vicinity of Frosses Bog the A26 carriageway is flanked on both sides by two sections of Scots Pines (named the Frosses Trees) which form distinctive local landscape features.

Other urban influences in the study area include the Logans retail facility which comprises a small selection of retail and commercial outlets. In addition, Drumadoon House, which is a listed building, trades as a tea room, and is located directly adjacent to the southbound carriageway of the A26 at the A26/ B94 (Drumadoon Road) junction. These built elements are relatively well concealed in this part of the landscape by intervening vegetation and surrounding topography. The Belfast to Londonderry / Portrush Railway Line (which is partly on embankment) runs in a north-south direction along the western extent of the River Main valley, immediately outside of the study area and is visible in sections.

Land use within the study area is dominated by a mix of semi-improved, arable or improved grasslands. Fields are used for grazing dairy and beef cattle, sheep, and for growing some arable crops such as barley, wheat, potatoes and maize. There is a strong field pattern geometry in the eastern part of the study area due to a clearly defined network of largely intact and low level hedgerows which contain many mature trees (predominantly ash with occasional beech, birch, sycamore, and elm). The majority of agricultural land within the Ballymoney Borough (north) is classified as grade 2 agricultural land with very good quality soil for farming.

Hedgerows to the west of the existing A26 traffic route tend to be in poorer condition and have been supplemented or replaced by post and wire fencing. A number of areas across the floodplain contain extensive areas of bogland and are in use for limited cattle and sheep grazing.

There are known to be archaeological remains within the study area, including several raths and a scheduled historic monument at Dundermot Motte.

4.6 Biodiversity

There are a number of statutorily protected nature conservation sites located within the study area, including:

- a European protected site – The Main Valley Bogs Special Area of Conservation (SAC);
- a nationally protected site – The Frosses Bog Area of Special Scientific Interest (ASSI); and
- locally protected sites – Killycreen North, Frosses North and Boyds Bog Sites of Local Nature Conservation Interest (SLNCI).

Drawing number A26-ENV-004 (Appendix D) is a preliminary environmental constraints plan, and shows the location and distribution of nature conservation sites and other key biodiversity features throughout the study area.

4.6.1 The Main Valley Bogs SAC/ASSI

The Main Valley Bogs SAC is subject to protection under the *EC Habitats Directive 92/43/EC* and comprises three active raised bogs which collectively form an important bog complex within the River Main valley. Although pool development within each of the component bogs is limited, they all exhibit a classic dome formation with hummocks and hollows. A distinguishing feature of the central bog areas are the unbroken bog-to-lagg transitions, which are the most extensive and well preserved examples in Northern Ireland. Furthermore, the three bogs are individually designated as ASSIs, the key UK designation. Descriptions for each component ASSI bog within the Main Valley Bog SAC are provided below:

- ***Caldanagh Bog ASSI*** - A compact lowland raised bog within the River Main series displaying a classic domed profile with minimal turf cutting around the periphery. An area of intact lagg along the north-eastern edge of the bog represents one of the most important features of the site. The intact surface supports a moderately well developed hummock and hollow complex and the surface of the bog is exceptionally wet supporting a dense and diverse cover of sphagnum mosses. Of particular note, the nationally rare *sphagnum pulchrum* is abundant in the hollows. Some of the peripheral peats have been cut for turf in the past, with vegetation communities ranging from deep artificial pools to purple moor grass, dominated grassland. The overall diversity of Caldanagh Bog is enhanced by a small esker ridge to the south-west, where the vegetation is dominated by a heath and grassland mosaic. The notable burnet saxifrage grows on this esker ridge. There is no public access to this site.
- ***Dunloy Bog ASSI*** - One of the largest remaining undamaged lowland raised bogs in Northern Ireland. Important for its bog-to-lagg transition. The site has extensive sphagnum moss cover together with several notable plant species, including burnet saxifrage and cowberry. There is no public access to this site.
- ***Frosses Bog ASSI*** - A compact, relatively undisturbed lowland raised bog representing the most southern example within the Main Valley Bogs SAC. The intact bog surface exhibits a well defined dome profile with structural features including hummock and lawn complexes, and small shallow pools. The bog supports a dense and diverse cover of sphagnum mosses, including the nationally rare *Sphagnum pulchrum* in the wetter hollows, and the notable hummock-forming moss *Sphagnum imbricatum*. The abundance of cranberry throughout the bog plain is notable and the presence of crowberry on the intact dome is an unusual feature on a lowland raised bog. The lagg surrounding the bog has been cut for turf, creating a mosaic of habitats dependent on peat depth and age of cutting. Vegetation communities range from acid pools choked with sphagnum mosses through acid grassland, to poor fen and swamp. There is no public access to this site.

4.6.2 Sites of Local Nature Conservation Importance (SLNCIs)

Sites of Local Nature Conservation Importance (SLNCIs) are designated in accordance with *PPS 2: Planning and Nature Conservation*. These sites are identified and protected on the basis of their floral, fauna or earth science interests. Three SLNCIs are located on the River Main floodplain to the west of the existing A26, including:

- Killycreen North;
- Boyd's Bog; and
- Frosses North.

4.6.3 Local Biodiversity Resource

Vegetation and habitats within the study area have been highly modified due to historical land clearing, agricultural development and urban settlement. A thin degraded, lineal strip of riparian vegetation straddles the bankside areas of the River Main channel as it passes through the study area.

The eastern part of the study area is generally characterised by improved and semi-improved grasslands and arable pasture. There are also several isolated patches of raised bog located immediately adjacent to the southbound carriageway of the A26 opposite Frosses Bog in the southern part of the study area.

The ecological value of habitats located to the east of the existing A26 is generally low. The habitat contains intervening hedgebanks and hedgerows, isolated stands of broad-leafed woodland, and small areas of bog land and thin riparian belts straddling minor watercourses flowing east to west across the existing A26 to their confluences with the River Main, presenting the only features of ecological interest.

In contrast, there is a mosaic of vegetation communities and habitats distributed across the River Main floodplain to the west of the existing A26, including:

- extensive areas of raised bog and floodplain mire;
- isolated patches of wet dwarf shrub heathland and fen floodplain;
- pockets of broad-leaved semi-natural woodland, coniferous plantation woodland and mixed plantation woodland;
- small belts of dense and continuous scrub;
- large blocks of improved and unimproved acid and marshy grasslands;
- dry or wet modified raised bog and acid grassland mosaics;
- quarrying and areas of bare ground; and
- standing water and running water associated with the River Main, its tributaries and local drainage ditches.

These vegetation communities and habitats exhibit varying levels of structure, species assemblage and diversity and moderation. Drawing number A26-ENV-001 (Appendix D) shows the distribution of these vegetation communities and habitats throughout the study area.

4.6.4 Protected Species

The extensive areas of bogland habitats located across the River Main floodplain, to the west of the existing A26, are known to be of interest for a range of protected species listed under *Annex II of the EC Habitats Directive 92/43/EC* and *The Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995*. Table 4.1 (overleaf) lists the key species recorded within the study area by the Centre for Environmental Data and Recording (CEDaR).

Recent wintering surveys conducted between November 2006 and February 2007 have indicated the following:

- observations of whooper swans within the study area. These are a listed species under *Annex I of the EC Wild Birds Directive 79/49/EC*. The swans tend to arrive in Northern

Ireland from Iceland between late October and early November to feed on a range of aquatic plants, grassed pastures and wintering barley;

- high levels of badger activity on both sides of the existing A26 in the southern and central sections of the study area;
- spraint markings and laying-up areas for otters along the River Main channel and associated tributaries such as the Cloghmills Water;
- derelict buildings and mature trees which could provide potential interest to bats and barn owls which are protected species;
- a number of listed wintering and breeding bird species; and
- potential habitats of interest for common lizard and the smooth newt.

The River Main is also known as a popular game fishing river for Atlantic salmon and brown trout, both of which are protected species. The River Main, Clogh River and Cloghmills Water are designated as economically significant under the Freshwater Fish Directive (78/659/EEC). The Clogh River and River Main have also recorded the presence of river water-crowfoot and white-clawed crayfish.

Table 4.1: Records of Key Protected Species

Group	Species	Record Date/s	NI Biodiversity & GB Status
Mammal	Otter, *Lutra lutra*	1980-1997	NI Species of Conservation Concern, NI Priority Species
Mammal	Badger, *Meles meles*	1997	Nationally protected
Invertebrate	Water beetle sp. *Graptodytes granularis*	1991	Notable
Invertebrate	Water beetle sp. *Ilybius guttiger*	1991	Notable
Invertebrate	Green hairstreak *Callophrys rubi*	1995-2004	NI Species of Conservation Concern
Invertebrate	Marsh fritillary *Eurodryas aurinia*	1975	NI Species of Conservation Concern, NI Priority Species Notable
Fish	Brown trout *Salmo trutta fario*	1985-1994	NI Species of Conservation Concern
Fish	Atlantic salmon *Salmo salar*	1993-1994	NI Species of Conservation Concern
Plant	Juniper *Juniperus communis*	Unknown	NI Species of Conservation Concern, NI Priority Species
Plant	Bog moss sp. *Sphagnum pulchrum*	1952-1995	Nationally Scarce
Plant	Liverwort sp. *Calypogeia azurea*	1979	Nationally Scarce
Plant	Scots pine, *Pinus sylvestris*	1985	Nationally Scarce
Plant	Bog moss sp. *Sphagnum imbricatum*	1953-1995	Notable
Plant	Moss sp. *Thamnobryum alopecurum*	1993	RDB3

4.7 Cultural Heritage

Information obtained from the DOE – EHS Built Heritage indicates that there are a number of archaeological, historic and cultural heritage resources located within, and surrounding the study area. The local heritage resource largely comprises historic houses, churches and a bridge.

Drumadoon House is a listed building located adjacent to the southbound carriageway of the existing A26 in the northern part of the study area opposite the Logans retail facility. Other notable heritage features include above ground or visible earthworks, historic parks and gardens.

Specifically, the cultural heritage resources identified from published sources (and known to exist throughout the study area) include raths, mounds, souterrains, crannogs, enclosures, standing stones, a graveyard, a megalithic tomb, circular crop marks, and a Motte and Bailey.

The majority of these remains date back to the early Christian period. This data indicates that archaeological resources from a number of archaeological periods, of various forms, are present within the study area.

In total, there are six listed buildings and five scheduled historic monuments located within or peripheral to the study area. Details of these heritage features are presented in table 4.2.

Table 4.2: Listed Building and Scheduled Historic Monument Records from the DOE – EHS Monuments and Buildings Record

Name	Address	Type	Status
Listed Buildings			
Fleming Hall	61 Antic Road, Dunloy Co. Antrim	Hall	B1 Listing
Killagan Cottage	49 Ballinaloob Road, Dunloy, Co. Antrim	Cottage	B1 Listing
RC Church of the Sacred Heart	Culcrum Rd, Cloghmills,Co. Antrim	Church	B Listing
Killagan Bridge	Drumadarragh, Dunloy, Co. Antrim	Bridge	B2 Listing
Drumadoon House	236 Frosses Road, Cloghmills, Co. Antrim	House	B2 Listing
Killagan Parish Church	51 Drumadoon Road, Cloghmills, Co. Antrim	Church	B1 Listing
Scheduled Historic Monuments			
Rath	Dunloy	Raised Rath	Scheduled Historic Monument D022 1948
Rath	Ballynaloob	Rath	Scheduled Historic Monument D0342 2179
Stones	Ballylig	Standing Stone	Scheduled Historic Monument D0906 3795
Clogh Castle	Cloghmills	Castle	Scheduled Historic Monument D0954 1470
Dundermot Motte	Dundermot	Motte	Scheduled Historic Monument D0607 1324

Source: DOE – EHS Built Heritage (Monuments and Buildings Record)

The study area (extending from the south at the Glarryford Crossroads to the A44 Drones Road junction) supports a mosaic of land use patterns that will have affected the integrity of the local cultural heritage resource to varying degrees. The township areas of Glarryford and around the Logans retail facility have undergone extensive land surface changes as a result of road and building construction, landscaping, and the installation of services. Similarly, the existing A26 has been subject to major landscape modification. The low-lying, open areas of floodplain associated with the River Main and its tributaries is predominantly cleared to form expanses of arable and improved grassland supporting a mixed regime of stock grazing (cattle and sheep)

and crop growing (e.g. wheat, maize, potatoes). Two minor parcels of woodland are situated on the central part of the River Main floodplain (i.e. Lowtown and Ballyhutherland).

Moreover, the extensive areas of boggy and waterlogged ground across the River Main floodplain are likely to contain potential palaeoenvironmental, archaeological, and well-preserved organic remains that have survived a range of historic and recent land clearing, settlement and agricultural activities.

The famous engineer and architect Charles Lanyon planted approximately 1,500 Scots Pines along the A26, in the southern part of the study area, in 1839. The overhanging trees (named the Frosses Trees) are a well known landmark for both locals and tourists and form part of the Northern Ireland Tourism Campaign.

Cloghmills has been identified as an area of archaeological potential. The village is located outside and to the east of the study area. Areas of archaeological potential have been identified where it is considered that archaeological remains are likely to be encountered in the course of future development or change.

Known cultural heritage features have been identified and illustrated on drawing number A26-ENV-004 (Appendix D). The details of these known features are as follows.

4.8 The Water Environment

4.8.1 Catchment Area

The study area lies wholly within the River Main catchment. The catchment covers approximately 106.85km^2 upstream of the study area and is drained by a diffuse network of minor watercourses and unnamed land drains which form part of the River Main system. These tributaries flow along a predominantly east-west axis before their confluences with the River Main.

4.8.2 Key water Features

The River Main is the principal watercourse which flows in a predominantly north-south direction through the western part of the study area before ultimately discharging into Lough Neagh approximately 25km downstream. There are three key tributaries which flow into the River Main either within or in proximity to the study area. Drawing number A26-HWY-001 (Appendix A) shows where these watercourses lie. They are described as follows:

- Killagan Water – this watercourse flows along the northern boundary of the study area, crossing the A26 just north of the A44 (Drones Road) junction. From its headwaters it flows initially in a westerly direction, prior to its crossing of the A44, before heading south and continuing for approximately 3km before its confluence with the River Main;
- Cloghmills Water – this flows in a predominantly westerly direction from its headwaters through the township of Clogh Mills prior to discharging into the River Main just south of the Logans retail facility in the central part of the study area; and
- Clogh River – is a watercourse which flows in a predominantly north-west direction before running parallel to the westbound carriageway of the B64 (Station Road and Springmount Road) and joining the River Main immediately south of Glarryford.

The River Main and its main tributaries are all classified as designated watercourses. There are also several small undesignated tributaries within the catchment.

The morphology of the River Main and its associated tributaries such as the Clogh River is medium, with river flows varying from fast flowing to slow flowing in certain sections. The river bed substrate can range from fine sand and silt to coarse gravel and cobbles. The catchment is calcareous, and likely to have a high base flow index. The hydrological regime is therefore more likely to have greater connectivity with groundwater and to exhibit a delayed and subdued hydrological response to rainfall events.

Water quality within the River Main is generally described as being good both for biological and chemical quality according to the 2000 General Quality Assessment. The *EC Freshwater*

Fisheries Directive 78/659/EC has designated the River Main, Clogh River and Cloghmills Water as economically significant as a as they are important in terms of salmon and trout fishing. Designated waters are required to comply with quality standards set out in this EC Directive. These three rivers are also classified as nutrient sensitive areas under the *Urban Waste Water Treatment Directive (UWWTD) (91/271/EEC)*. The UWWD seeks to protect water bodies from adverse effects of domestic sewage, industrial waste water and surface water run-off. It identifies water bodies which are eutrophic or which in the future may become eutrophic if preventative action is not taken.

The Cloghmills Water is also designated as a nutrient sensitive area under the *Nitrates Direcitve (91/676/EEC)*.The Nitrates Directive aims to prevent and reduce water pollution by nitrates from agricultural sources. The Cloghmills Water has been identified as being affected by pollution and as such requires implementation of action plan.

Seventy-eight groundwater abstractions have been identified within the defined area. No surface water abstraction points have been identified during this stage 1 scheme assessment.

4.8.3 Flood Risk

The flooding behaviour within the study area is influenced by the location of existing and proposed physical barriers which either obstruct or constrict the movement of floodwaters generated by the River Main and its tributaries through the study area. There are a number of existing structures located in the River Main that potentially affect water flow such as the B93 (Killagan Road) Bridge located upstream of Clogh Mills junction, the Dundermot Road Bridge and Glarryford Railway Bridge which are located both upstream and downstream of the River Clogh and River Main confluence at Glarryford.

Downstream of Clogh Junction there are flood control sluice gates located near Dunminning Bridge which regulate floodwater movements and paths, and generate a level of afflux. In the upstream catchments areas of the River Main there are other structures located along the River Killagan prior to its confluence with the River Main. These structures include a bridge located at Flax Mill, Drones Road Bridge, Killagan Bridge and Frosses Road Bridge respectively. Several of these bridges have piers positioned within the channel of the River Killagan which impede floodwater flows as they pass through this section of the catchment.

The principal structures situated along the Cloghmills Water include the Clogh Mills Bridge, Drumnaglek Bridge along Frosses Road and the two corrugated steel pipes located directly upstream of the confluence with the River Main which maintain transverse flows across two local access roads.

Flows in the River Clogh are potentially affected by several bridge structures including the Tullynewy Bridge, Ford Footbridge, New Bridge and New Bridge II in Drumakeely and Glarryford Bridge near Dundermot. There are also several stepping stone crossings located in the river channel along the length of the River Clogh that potentially affect the flow in the river.

Historical flow data provided by the Rivers Agency and recorded at Dromona gauging station (No. 203011) showed that a peak annual maximum flow of 85.94m³/s occurred on the 15 November 2002. The median annual maximum flood flows recorded at this gauging station were 59.64m³/s.

To determine the lateral extent of the 1: 100 year flood event, a flood risk assessment (FRA) was undertaken in accordance with the provisions of *PPS 15: Planning and Flood Risk* and *CIRIA C624 Development and Flood Risk – Guidance for the Construction Industry* and in consultation with the Rivers Agency. The lateral extent of the 1: 100 year flood level varied between 83.81m and 82.29m across the River Main floodplain. The water levels along the Cloghmills Water tributary range between 94.04m upstream and 83.04m at its confluence with the River Main. This flood extent does not encroach upon the existing A26.

The indicative 1:100 year flood extent is shown on drawing number A26-ENV-003 (Appendix D).

4.9 Physical Fitness

The A26 forms one of the key road transport routes linking Belfast to the North Antrim coast of Northern Ireland and is a busy commuter route.

The existing highway cross-section, apart from a short section of footway in the vicinity of the Logans retail facility, does not have any pedestrian or cyclist facilities. Furthermore, the existing carriageway verges are considered narrow and unsuitable for pedestrian usage.

The road has a relatively poor safety record and does not contribute to a positive physical fitness baseline condition. However, the surrounding landscape has the potential to provide walking trails through the undulating drumlins and Main Valley bogs. Access to the river is provided at various points for recreational fishing from bankside areas.

There are no formal public rights of way within the study area.

4.10 Journey Ambience

The WebTAG assessment considers three components of journey ambience – traveller care, traveller's view and traveller stress.

Traveller care relates to the facilities and information which are provided along a route and by their spacing and quality. A commercial facility, comprising mainly retail and food, is located at Logans. It is located at a busy junction between the A26 and the B94 (Drumadoon Road), and access is relatively poor when travelling south.

Clogh Mills is located a short distance east of the A26. The town provides a limited range of retail, educational, community and commercial facilities. Dunloy is located to the west of the A26, to the northern end of the study area and Glarryford is located at the southern end of the study area, again to the west of the A26.

Like Clogh Mills, Dunloy and Glarryford provide a range of retail facilities and services. There are also two petrol filling stations along this section of the A26, one at the southern end, the other in the middle of the study area. Traffic direction signage is limited along the existing road, both in terms of specific information and general travel information.

Traveller's view is concerned with what travellers can see in the surrounding landscape and the attractiveness of the general travelling environment. Certain sections of the existing A26 corridor are considered to provide high quality journey ambience, such as the section which passes through the overhanging Frosses Trees. These two tree-lined sections of the A26 are a well known landmark for tourists and form part of NI Tourism Campaign. Travelling through this section of the A26 can be described as pleasant in terms of traveller's view. The undulating landscape also provides a pleasant driving experience.

However, the existing A26, in parts, consists of poor road surfacing with a lack of safe opportunities to overtake and is a relatively narrow single lane two-way carriageway. The road currently caters for a high volume of road traffic leading to platoons of slow-moving traffic and driver delay. Overall, particularly during times of high traffic flow, a poor (or negative) journey ambience is experienced, possibly increasing traveller stress and frustration.

Traveller stress consists of three components – frustration, fear of potential accidents and uncertainty relating to the route being followed. These are evaluated based on three grades – low, moderate and high. Overall, a coarse, qualitative assessment of driver stress associated with driving on this section of the A26 could be described as moderate. This section of the A26 has a safety record comparable with national statistics for a road of this type.

5 Traffic and Need for the Scheme

5.1 Introduction

An initial investigation of the existing and future transport conditions within the A26 study area has been undertaken.

5.2 Existing Conditions

5.2.1 General Observations

From on-site observation of traffic conditions during June/ July 2006, it was concluded that:

- Free flow traffic conditions were at times compromised on the northbound A26 at the change from dual to single carriageway just south of the B64 Glarryford Crossroads (Station Road / Springmount Road junction). This created a pinch-point where traffic capacity was reduced;
- Because of the incorporation of ghost islands throughout the route, there was relatively little delay to through traffic as a result of right turning traffic at junctions. However, for vehicles approaching the A26 from the side roads, queues of up to four or five vehicles were observed to form on the B94 (Drumadoon Road) approach to its junction with the A26, but these generally cleared relatively quickly;
- There are few safe overtaking opportunities throughout the length of the A26 study area. This was because of several factors including inadequate forward visibility and the presence of high volumes of opposing traffic limiting the number of safe gaps in oncoming traffic in which to overtake; and
- Traffic speeds on the A26 were often significantly constrained during peak hours because of the volume of traffic, which was exacerbated by slow moving traffic creating platoons of vehicles.

5.2.2 Existing Traffic Flows

Automatic Traffic Counts (ATCs) were undertaken on 8 sites in the study area between the dates of 16th of June and the 23rd of July 2006. The count locations are shown in figure 5.1, overleaf. A summary of the existing average daily traffic, as calculated from the ATC count data is presented in Table 5.1, directly after figure 5.1.

It should be noted that the flows in table 5.1 provide only an approximate value for Annual Average Daily Traffic (AADT) (i.e. total annual traffic divided by 365). Long-term data (which will provide AADT values) will be available during the course of the stage 2 scheme assessment study from an ATC site located on the A26 (installed in September 2006).

The flow data in table 5.1 is illustrated in figure 5.2. It can be seen that the average 24 hour 2-way traffic flows on the A26 are in the region of 15,500 to 18,500 vehicles per day, with the highest flows being experienced at the northern end of the A26 study area.

In order to validate the newly collected data, a comparison was undertaken with Roads Service traffic census data, available for the year 2004 for locations on the A26 adjacent to the study area (census locations are also illustrated in figure 5.1, for ease of reference). A comparison of census data with newly collected 2006 data is presented in Table 5.2.

Figure 5.1: Traffic Count Locations

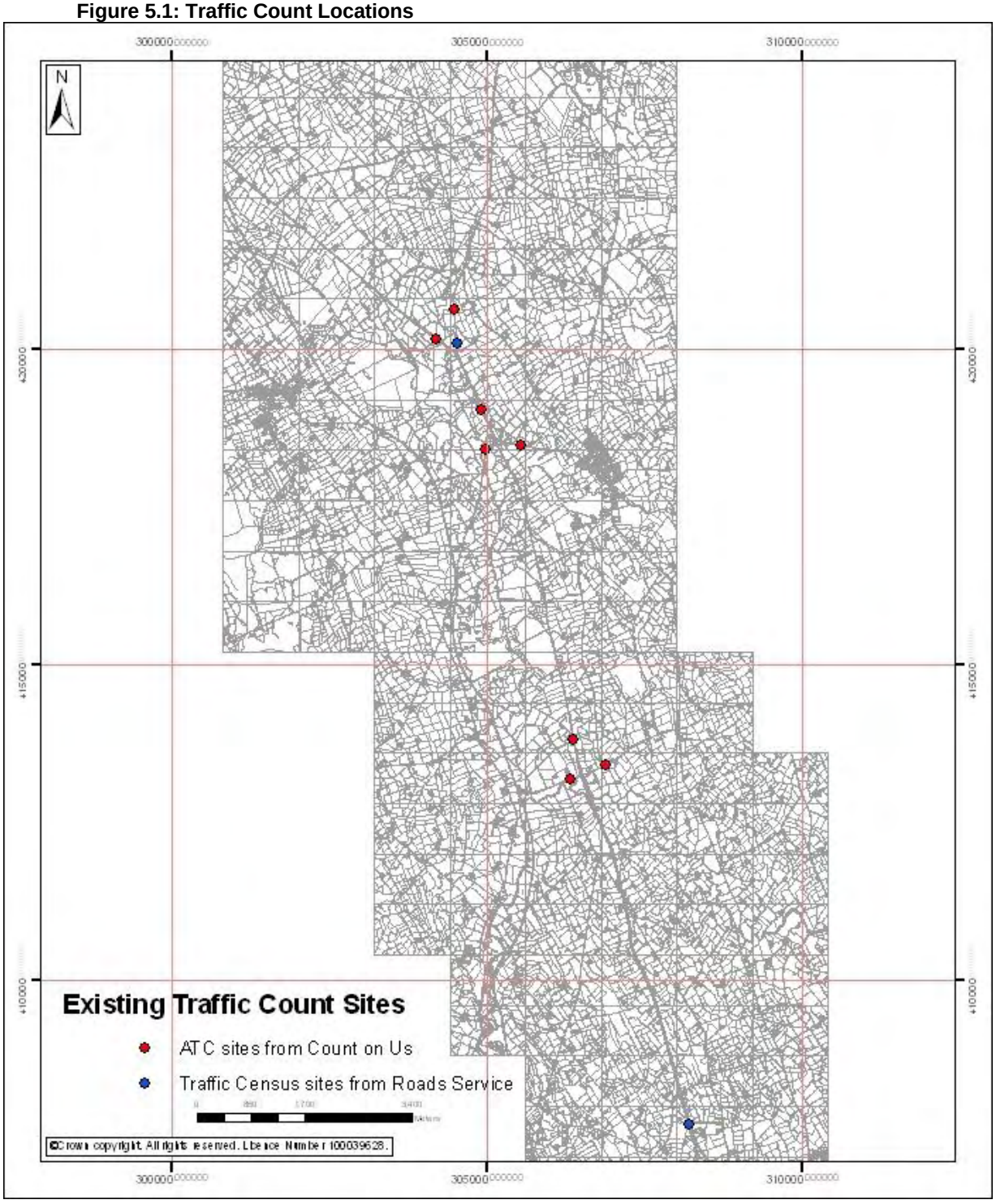


Table 5.1: Existing Average Daily Flow of Traffic

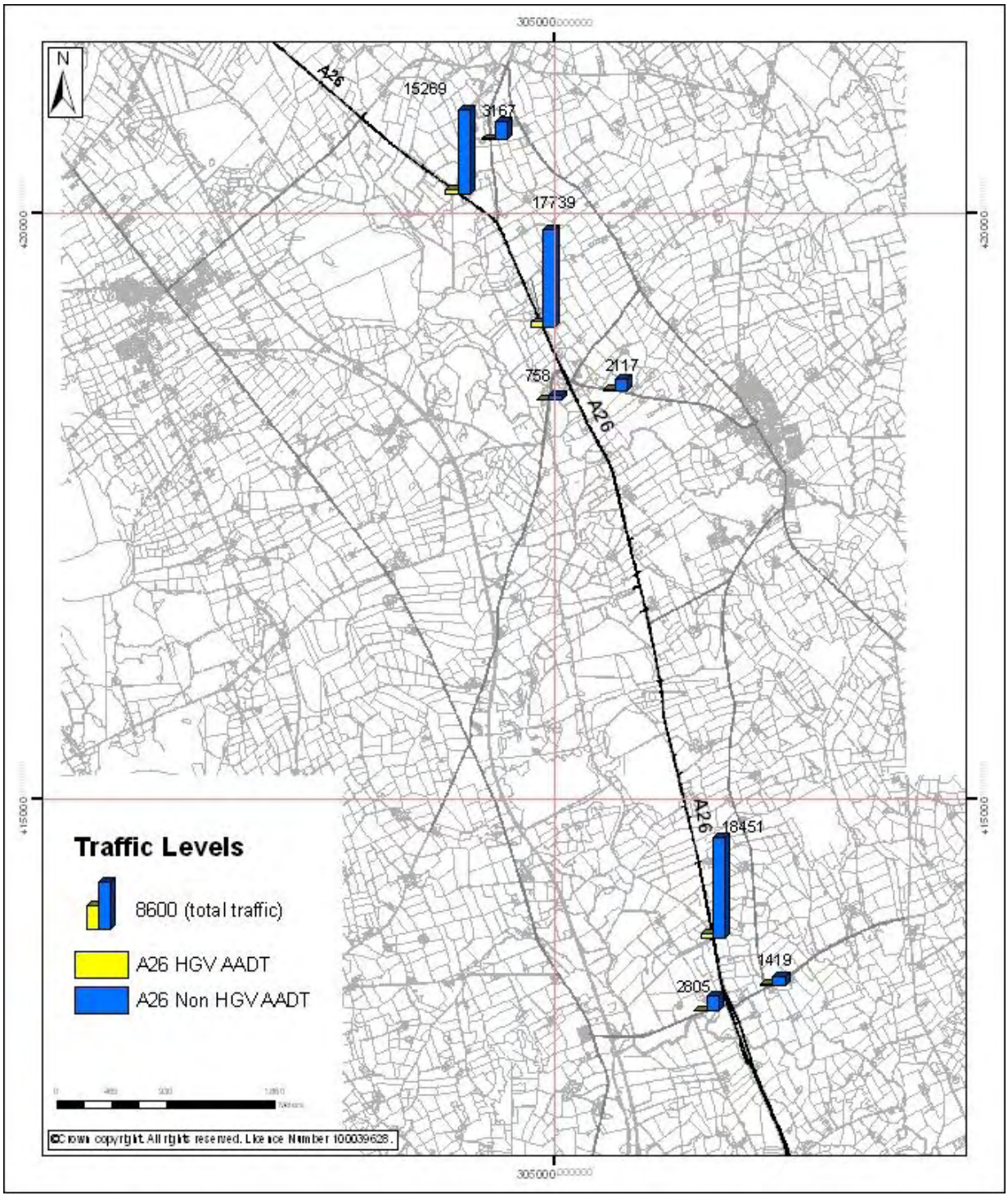
Road	Count Site No.	Location [see Figure 5.1]	Direction of Flow	Average 24 Hour AADT (June-July 2006)	Average 2-way AADT (June-July 2006)
A26	3	3 - A26, 600 metres north of B64	northbound	9192	18451
			southbound	9259	
	6	6 - A26, 400 metres north of B93	northbound	8883	17749
			southbound	8856	
	8	8 - A26, 400 metres north of A44	northbound	7607	15268
			southbound	7661	
Other Roads	1	1 - B64 (Station Road), 200 metres west of A26	eastbound	1394	2806
			westbound	1412	
	2	2 - B64 (Springmount Road), 400 metres east of A26	eastbound	712	1419
			westbound	707	
	-	Lisnasoo Road	eastbound	984	1929
			westbound	945	
	4	4 - B93 (Killagan Road), 300 metres west of A26	northbound	363	758
			southbound	395	
	5	5 - B94 (Drumadoon Road), 400 metres east of A26	eastbound	1083	2118
			westbound	1035	
	7	7 - A44 (Drones Road), 700 metres north of A26	northbound	1536	3167
			southbound	1631	

Table 5.2: Comparison of Roads Service Traffic Census and 2006 Traffic Data

Direction of Flow	Census data (2004 AADT)		Average 24 Hour Daily Flow (June-July 2006)		% difference (2006 data - Census)
northbound	Census Point 113 A26 North of M2	9630	Site 3	9192	-4.55%
southbound		9590		9259	-3.45%
northbound	Census Point 317 A26 South of Ballymoney	7280	Site 8	7607	4.50%
southbound		7150		7661	7.15%
northbound	Census Point 328 A44 (Drones Road) north of A26	900	Site 7	1536	70.66%
southbound		1390		1631	17.31%

It can be seen that the census point 328 (on the A44) has significantly lower flows in the northbound direction, when compared to southbound census data and new 2006 data. The northbound census data is therefore considered erroneous.

Figure 5.2: 2006 24-hour Average Daily Traffic Flows



5.2.3 Definition of 'Capacity' and 'Congestion'

There is no absolute measure that can be said to represent the "capacity" of a link in the highway network; it is simply a matter of decreasing speeds, deterioration of operating conditions, or a declining level of service as perceived by users. In DMRB, the concept of the congestion reference flow (CRF) is used as a measure against which to judge acceptable performance.

The congestion reference flow (CRF) of a link is an estimate of the annual average daily traffic (AADT) flow at which the carriageway is likely to be 'congested' in the peak periods on an average day. For the purposes of calculating the CRF, 'congestion' is defined as the situation when the hourly traffic demand exceeds the maximum sustainable hourly throughput of the link. At this point, the effect on traffic is likely to be one or more of the following:

- traffic flow breaks down with speeds varying considerably;
- average speeds drop significantly; and
- the sustainable throughput is reduced, and queues are likely to form.

The CRF of a link is calculated by the formula:

CRF = CAPACITY*NL*Wf*100PkF*100/PkD*AADT/AAWT

Where:

- CAPACITY is the maximum hourly lane throughput (***Capacity = A – (B x Pk%H)*** vehicles, where A and B are lane capacity factors, and Pk%H is the % HGV);
- NL is the number of lanes per direction;
- Wf is a width factor;
- PkF is the proportion (percentage) of the total daily flow (2-way) that occurs in the peak hour;
- PkD is the directional split (percentage) of the peak hour flow;
- AADT is the annual average daily traffic flow on the link; and
- AAWT is the annual average weekday traffic flow on the link.

Because the CRF value represents congested conditions, it is sensible to use it to understand today's or forecast conditions without the scheme, but it is not wholly applicable to the design of new facilities.

The values for each of the above factors were derived from an analysis of existing traffic counts (to obtain data on HGV composition, tidality etc). The CRF, which in the table below relates to a single 2-lane carriageway (S2AP).

CRF has been calculated using the methodology given in TA 46/97 and represents the flow (AADT) at which traffic problems become severe, i.e. when the traffic flow in a section reaches the CRF it is considered to be at 100% stress. However, problems are usually experienced before the CRF level is reached and it is generally accepted that journey time reliability, and driver stress starts to be affected when the CRF reaches 75% (WebTAG Unit 3.5.7, Section 2). Therefore, for the purposes of this assessment, 75% CRF is taken as the limit for journey time reliability and is the point at which congestion begins to be experienced.

5.2.4 Traffic Capacity Assessment – Existing Conditions

A CRF assessment of the existing A26 has been undertaken using the guidance set out in TD 46/97, as follows.

Capacity = A – (B x Pk%H)

A and B are parameters dependant on road standard. For a single carriageway, TD 46/97 suggests values of 1380 and 15.0 respectively. Pk%H is the proportion of HGVs during the peak hour (5.8%).

Capacity of existing A26 = 1380 – (15x5.8) = 1293 vehicles per hour per lane

Assessment of the CRF for the A26 has been based upon the parameters set out in table 5.3.

Table 5.3: Calculation of Congestion Reference Flow (CRF)

Parameter		Value
Number of lanes	NL	1
width factor	Wf	0.947
percentage of daily flow in the peak hour	PkF	9.24
directional split percentage in the busiest direction	PkD	62.16
annual average daily traffic	AADT	18451
annual average weekday traffic	AAWT	18731

CRF = CAPACITY x NL x Wf x 100 / PkF x 100 / PkD x AADT / AAWT

= 1293 x 1 x 0.947 x 100 / 9.24 x 100 / 62.16 x 18451 / 18731

= 21,000 vehicles/day

Table 5.4 shows a comparison of CRF with observed traffic flows for the A26.

Table 5.4: Comparison of Existing CRF with 2006 Traffic Flows on A26

Year	Flows (AADT)	Estimated CRF	Flow as % of CRF
2006	18451 *(observed)*	21000	88%

It can be seen that the existing A26 has a CRF of 21,000 vehicles per day, and currently experiences an 88% ratio of existing flow to CRF. This is in excess of the 75% limit for journey time reliability and there is therefore evidence of existing congestion for the route.

5.2.5 Bus Services

The A26 is on the route for buses connecting Belfast and Ballymena in the south, with Coleraine, Portrush and Ballycastle in the north. The bus routes and stops in the area are shown in figure 5.3 overleaf. The services using the routes and their frequencies are given in table 5.6 (overleaf).

5.2.6 Pedestrians and Cyclists

There is only limited pedestrian provision along the existing A26 corridor. The only section of formal footway on the A26 is on either side of the B93 (Killagan Road) junction, as indicated in figure 5.3 above). From observation there is no significant pedestrian movement along the A26 corridor, although the community facilities in Killagan appear to generate some limited pedestrian crossing demand. There is no other footway provision along the scheme.

The A26 is not a part of the National Cycling Network and there are no cycle lanes, or cycle facilities, directly associated with the road.

Figure 5.3: Bus Routes, Stops, and Pedestrian Facilities

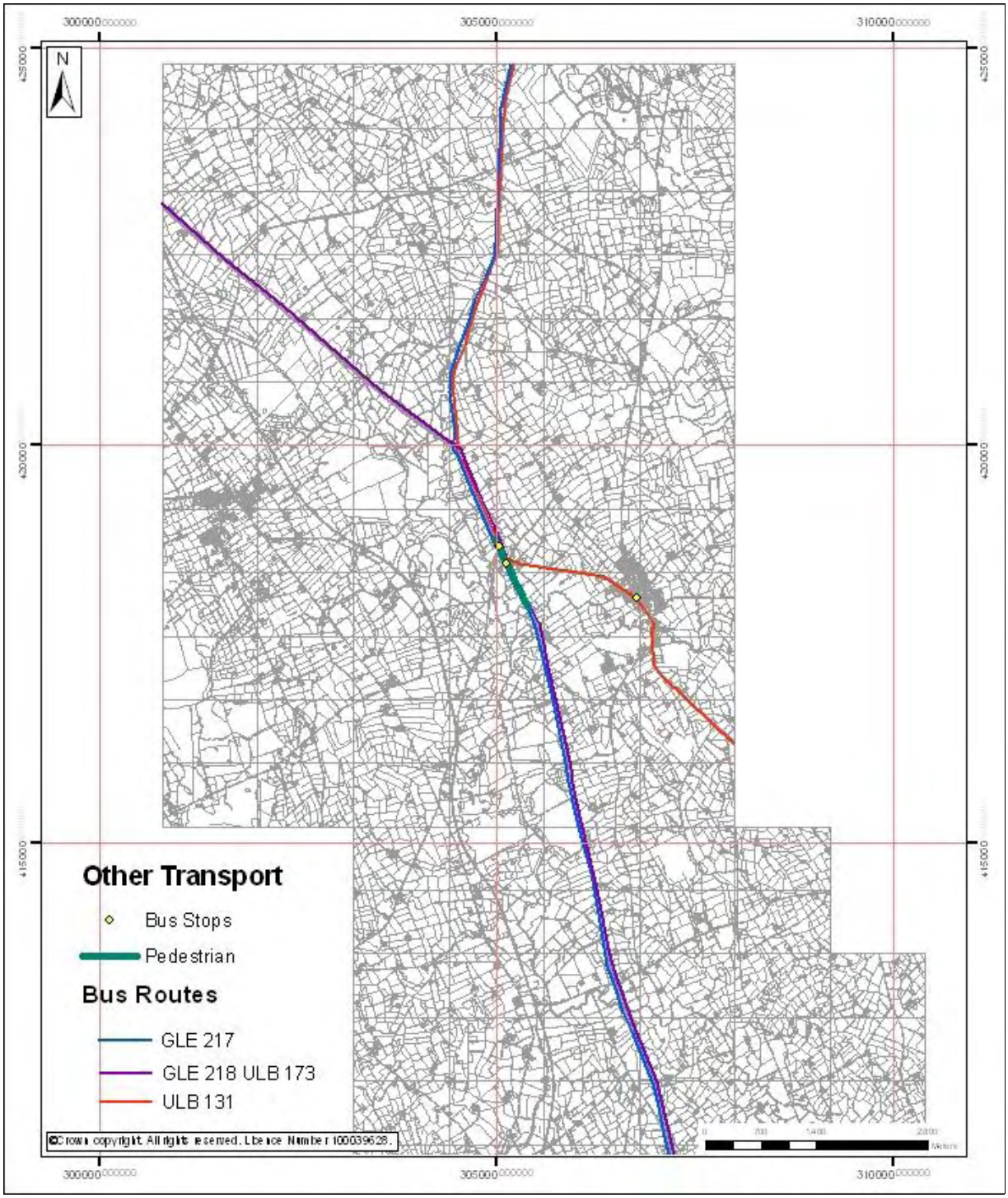


Table 5.6 - Bus Services along the A26 Study Area

Direction	Goldline 217 (between Belfast Laganside and Ballycastle)		Goldline 218 (between Belfast Laganside and Portrush)			Ulsterbus 173 (between Ballymena and Coleraine)		Ulsterbus 131 (between Ballymena and Ballycastle via Clogh)	
	Mon to Fri	Sat	Mon to Fri	Mon to Fri	Sat	Sat	Sun	Mon to Fri	Sat
Northbound	Leave B'mena at 10:05,12:35& 14:35 Note: no stops at Killagan	Leave B'mena at 12:35,14:35& 16:35 Note: no stops at Killagan	At 10:00 then hourly from B'mena 10:30 till 19:30 Each service stops at Killagan	Leave CloghMills at 7:55 Leave B'mena at 8:45,9:35 15:45 &17:05 Each service stops at Killagan	Leave B'mena at 8:50	Hourly from B'mena 10:30 till 18:30 Each service stops at Killagan	Leave B'mena at 14:30,20:30&21:40 Each service stops at Killagan	Leave Clogh Mills at 09:32, 13:42, 16:17& 18:12 Each service stops at Killagan	Leave Clogh Mills at 08:50, 11:50, 16:00 &17:40 Only; Also leaves Killagan at 8:50 & 17:40
Southbound	Leave B'castle at 06:40,09:05&10:55 Note: no stops at Killagan	Leave B'castle at 10:55 &14:55 Note: no stops at Killagan	Hourly from B'money from 08:28 to 19:28 Each service stops at Killagan	Leave B'money at 07:45 &15:50 Each service stops at Killagan	No s/bound services	Leave B'money at 07:13, 09:28,11:28, 13:28, 14:28,15:28, 18:28 &19:28 Each service stops at Killagan	Leave B'money at 11:28, 17:28 & 18:03 Each service stops at Killagan	Leaves Clogh Mills at 7:55 Leave Killagan at 08:00, 10:00, 14:45, 16:10 & 17:00 Each service stops at Clogh Mills	Leaves Killagan at 08:10, 09:10 &13:25 Each stops at Clogh Mills; Also leaves Clogh Mills at 12:25 & 16:35

5.2.7 Road Safety on the Existing Route

An analysis has been undertaken of the recorded personal injury accidents over the past three years within the study area. The accident locations over this period can be seen in figure 5.4 overleaf. The conclusions of the analysis are listed below:

- In the three year period, comprising 2002 to 2004, there were 39 personal injury accidents on the A26 between the Glarryford crossroads and the Dunloy crossroads;
- Comparison with national accident trends (from the DMRB COBA manual) show that accident rates along the A26 are typical for this type of rural road and junctions. Statistically, this section of the A26 is not an unusually unsafe section of road;
- Straight-ahead, shunt type accidents, particularly due to stopping and slowing in heavy traffic, were the biggest cause of accidents;
- Vehicles turning in and out of private accesses are not a significant cause of accidents;
- It is apparent that movements by agricultural vehicles and other heavy vehicles are not a significant cause of accidents; and
- Analysis of accident trends shows that there are no significant causation relationships with regard to the time of year, month, or day.

The overall conclusion with regard to road safety is that straight-ahead, shunt type accidents are the most common type of accidents, although the accident rate is not unusually high. In order to reduce the occurrence of shunt accidents, the occurrence of queuing and slowing down of vehicles on the A26 should be minimised.

Figure 5.4: Plot of accidents from 2002 to 2004

5.3 Future Conditions

5.3.1 Traffic Forecast Years

A year of scheme opening of 2012 has been agreed with Roads Service as a basis for future traffic forecasts. The assessment of future conditions has been agreed to be undertaken for the design year of 2027, which equates to 15 years after opening, as recommended in *TD37/93, Assessment of Road Schemes*.

The forecast flows are based on observed flows as previously described in section 4.2.2.

5.3.2 Traffic Growth and Forecast Flows

Discussions with staff responsible for the Northern Ireland Strategic Transport Model (NISTRM) were held to discuss future traffic growth forecasts. It was agreed that NISTRM growth forecasts would be adopted for this study.

NISTRM forecasts are based upon Northern Ireland Planning Service indicators of future developments. NISTRM provided a growth forecast for up to 2016 (which amounts to a growth factor of 1.16 from 2006). In agreement with NISTRM staff, this growth was applied on a compound basis as a year-on-year growth from 2006 to give a 2012 year of opening growth forecast of 1.09 (from 2006).

Forecasts for the period 2016 to 2027 are based on current (2006) DfT National Road Traffic Forecasts (NRTF), in which growth is forecast as a year-on-year value of 1.2%. Thus growth from 2016 to 2027 is 1.012^{11} (= 1.140, i.e. 14.0% growth). The growth factor from 2006 to 2027 is therefore the multiple of the growth factor from 2006 to 2016 (1.16) and that from 2016 to 2027 (1.14), i.e. 1.32.

Forecast growth and resultant traffic flow estimates for both the notional year of opening and 15 years after opening, are shown in table 5.7, and figure 5.5 below. It should be noted that the flows are only approximate, since the AADT value for 2006 was based on June/ July 2006 data only.

Figure 5.5: Present & Future Year Traffic Flows

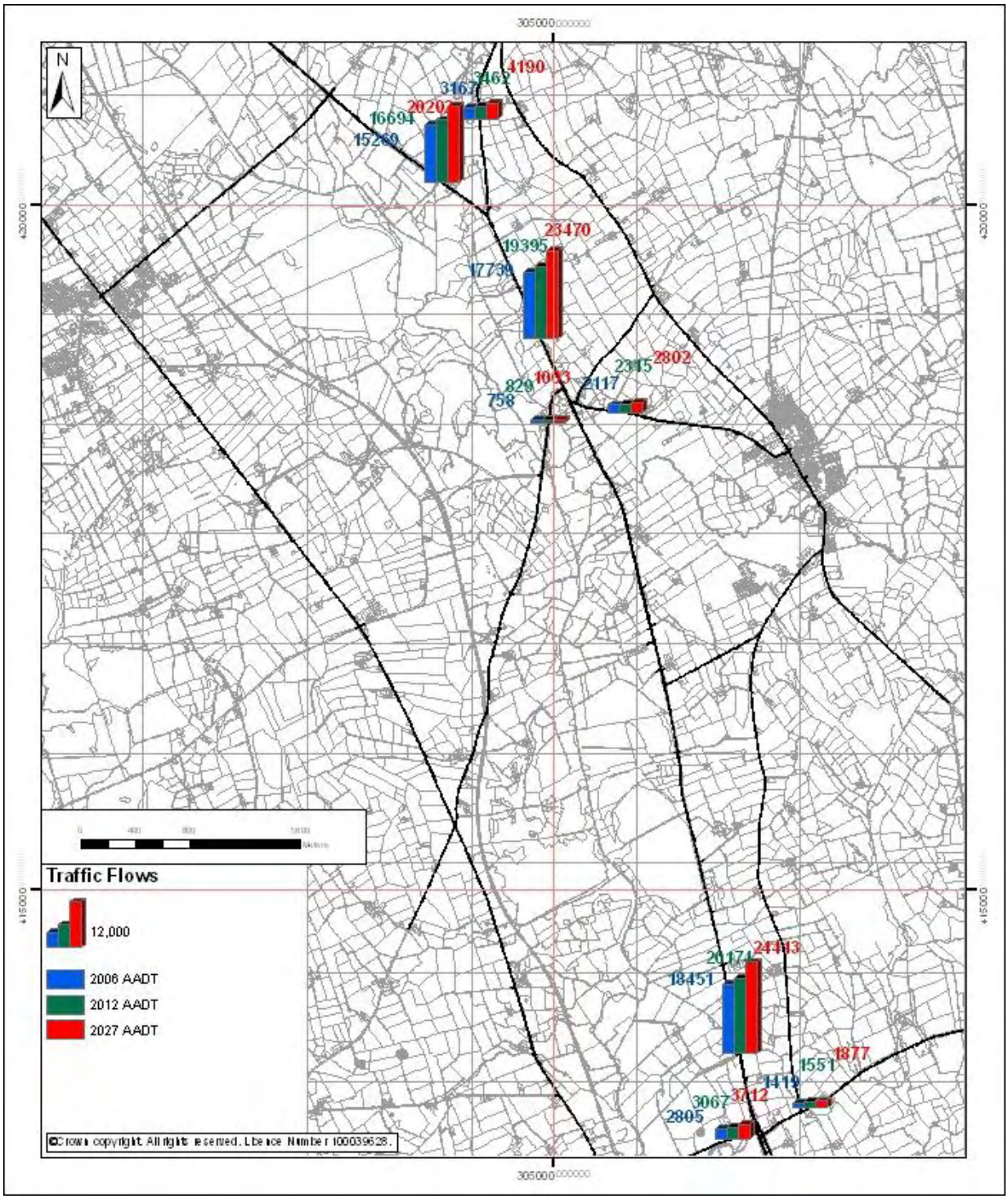


Table 5.7: Existing and Forecast A26 Traffic Flows

Year	Traffic Growth Factor Estimate (from 2006)	Forecast Traffic Flows (2-way) (AADT)
2006	n/a	18451 *(observed)*
2012	1.09	20174 *(forecast)*
2027	1.32	24413 *(forecast)*

5.3.3 Traffic Capacity Assessment – Future Conditions

Utilising the CRF methodology previously outlined in sections 5.2.3 and 5.2.4, an assessment of the future traffic performance of the route was undertaken. The assessment provides a do-minimum scenario, where the existing A26 is not improved, but background traffic continues to grow.

Table 5.8 provides the results of the CRF assessment for the existing A26 under future traffic conditions.

Table 5.8: Comparison of Existing CRF with Future Traffic Flows on A26

Year	Forecast Flows (AADT)	Estimated CRF	Flow as % of CRF
2012	20174	21009	96%
2027	24413	21009	116%

Table 5.8 shows that the existing A26 will be operating with a forecast flow to CRF ratio well in excess of the 75% limit for journey time reliability, and at 96% in 2012 is approaching its absolute capacity limit. In 2027 the existing A26 is predicted to have a CRF of 116%, which is well in excess of its theoretical capacity limit, and is approaching the upper level (125%) for maximum driver stress.

It can therefore be concluded that the existing single carriageway A26 will suffer major congestion and result in associated high levels of driver stress within the next decade if no route improvement is implemented.

5.4 Route and Carriageway Standard

5.4.1 Need for Assessment

This route improvement scheme is included within the Regional Strategic Transport Network Transport Plan (RSTN TP) and in the Roads Service 5 to 10 year Forward Planning Schedule. The scheme was described in the RSTN TP as ‘A26 Glarryford - A44 Junction (upgrade to dual carriageway)’.

This section provides an assessment to determine the appropriate road standard based upon the traffic forecasts previously established for the scheme.

5.4.2 Initial Assessment (DMRB TA 46/97)

Volume 5, Section 1, Part 3, TA 46/97 of DMRB, *Economic Assessment and Recommended Flow Ranges for New Rural Road Links,* provides guidance on the economic benefits of providing different carriageway standards on rural roads. Table 5.9 (overleaf) shows the range of flows and associated recommended carriageway standard within the guidance.

For an opening year of 2012, the A26 has been predicted to be carrying an AADT of 20174 (provided in Table 5.8). Comparing this flow with the flow ranges provided in Table 5.9 indicates

that a carriageway standard of dual all-purpose carriageway (D2AP) would be the most appropriate.

Table 5.9: Opening Year Economic Flow Ranges

Carriageway Standard	Opening Year AADT	
	Minimum	Maximum
S2	Up to	13,000
WS2	6,000	21,000
D2AP	11,000	39,000
D3AP	23,000	54,000
D2M	Up to	41,000
D3M	25,000	67,000
D4M	52,000	90,000

5.4.3 Congestion Reference Flow Assessment

This section contains a CRF assessment of two potential scenarios for an improved A26 corridor: wide single carriageway (WS2) and all-purpose dual carriageway (D2AP).

5.4.3.1 Wide Single Carriageway

Capacity = A – (B x Pk%H)

A and B are parameters dependant on road standard. For a wide single carriageway, TD 46/97 suggests values of 1380 and 15.0 respectively. Pk%H is the proportion of HGVs during the peak hour (5.8%).

Capacity of 'WS2' A26 = 1380 – (15x5.8) = 1293 vehicles per hour per lane

Assessment of the CRF for a wide single carriageway has been based upon the parameters set out in table 5.10.

Table 5.10: Calculation of Congestion Reference Flow (CRF)

Parameter		Value
Number of lanes	NL	1
width factor	Wf	1.46
percentage of daily flow in the peak hour	PkF	9.24
directional split percentage in the busiest direction	PkD	62.16
annual average daily traffic	AADT	18451
annual average weekday traffic	AAWT	18731

CRF = CAPACITY x NL x Wf x 100 / PkF x 100 / PkD x AADT / AAWT

= 1293 x 1 x 1.46 x 100 / 9.24 x 100 / 62.16 x 18451 / 18731

= 32,375 vehicles/day

5.4.3.2 All-purpose Dual Carriageway

Capacity = A – (B x Pk%H)

A and B are parameters dependant on road standard. For a dual carriageway, TD 46/97 suggests values of 2100 and 20.0 respectively. Pk%H is the proportion of HGVs during the peak hour (5.8%).

Capacity of 'D2AP' A26= 2100 – (20x5.8) = 1984 vehicles per hour per lane

Assessment of the CRF for a dual carriageway has been based upon the parameters set out in table 5.11.

Table 5.11: Calculation of Congestion Reference Flow (CRF)

Parameter		Value
Number of lanes	NL	2
width factor	Wf	1.0
percentage of daily flow in the peak hour	PkF	9.24
directional split percentage in the busiest direction	PkD	62.16
annual average daily traffic	AADT	18451
annual average weekday traffic	AAWT	18731

CRF = CAPACITY x NL x Wf x 100 / PkF x 100 / PkD x AADT / AAWT

= 1984 x 2 x 1.0 x 100 / 9.24 x 100 / 62.16 x 18451 / 18731

= 68,053 vehicles/day

5.4.3.3 CRF Future Carriageway Standard Assessment

Table 5.12 provides an assessment of the forecast flow as a percentage of CRF for both the corridors of WS2 and D2AP carriageway standards.

Table 5.12: Comparison of Improved Carriageway CRF with Future Traffic Flows on A26

Carriageway Standard	Year	Forecast Flows (AADT)	Estimated CRF	Flow as % of CRF
WS2	2012	20174	32375	62%
	2027	24413	32375	75%
D2AP	2012	20174	68053	30%
	2027	24413	68053	36%

For a WS2 carriageway standard, at the design year, 2027, the forecast flow to CRF ratio would be expected to be 75%. This is considered to be the limit for journey time reliability, and would be the threshold at which congestion and driver stress are acknowledged. It should also be noted that the DMRB states that the use of WS2 carriageways for lengths in excess of 2km would require special approval from the overseeing organisation. The route length in this instance is 7km.

For a D2AP carriageway standard, at the 2027 design year, the A26 would be expected to operate with no congestion, having a forecast flow to CRF ratio of only 36%.

In addition, if traffic growth continued beyond the design year of 2027, a WS2 route would be expected to suffer increasing levels of congestion, whereas improving the A26 to all-purpose dual carriageway standard would provide a route without congestion well beyond the design year (2027). Many sections of the existing A26 (outside this study area) have already been improved to dual carriageway standard.

Traffic disruption during construction would be a major disadvantage with a WS2 scheme. Furthermore, improving this section of the A26 to WS2 carriageway standard would not remove the bottleneck capacity problems around the Glarryford junction (northbound) where the A26 would still reduce from existing two lanes down to a single lane.

In conclusion improving this section of the A26 to D2AP carriageway standard would be the most appropriate solution for this scheme.

5.5 Junction Strategy

This stage 1 assessment is a strategic assessment to assess corridors for the A26 Dualling – Glarryford to A44 Drones Road improvement scheme. The level of traffic data and traffic modelling available at stage 1 is insufficient to make decisions on the proposed forms of junction for the dualling scheme. The junction strategy to be adopted will be decided during the stage 2 assessment process.

However, for the purposes of aiding the stage 1 assessment process, in terms of providing a robust cost estimate for the economic assessment, the assumption was made that the following junction forms would be utilised for the scheme:

- A26/ B64 (Station Road/ Springmount Road) – Compact grade separated junction;
- A26/ Lisnasoo Road – Compact grade separated junction;
- A26/ B94 (Drumadoon Road)/ B93 (Killagan Road) – Compct grade separated junction; and
- A26/ A44 (Drones Road) – at grade roundabout.

An at-grade roundabout was assumed for the junction between the A26 and the A44 Drones Road), at the northern end of the scheme, as this would create a convenient opportunity to safely tie the proposed dual carriageway into the existing single carriageway road further north.

Grade separation was assumed for the three side road junctions in the middle of the scheme based upon a coarse economic assessment, which compared a grade separated junction with an at-grade roundabout.

The coarse assessment was based upon comparing journey time benefits for mainline traffic on the A26 having an unimpeded journey along the A26 compared with the journey time penalties experienced by traffic having to slow down as a result of negotiating an at-grade roundabout, whilst also assessing the impact of capital cost. The analysis was undertaken using ARCADY to establish journey time penalties for a roundabout (based over a 60 year period), and TUBA was used to assess crude net present value (NPV) for the junction, based upon 2002 prices. The following assumptions were used:

- Cost for an at-grade roundabout was taken as £0.45M (2006 prices).
- Cost for compact grade-separated junction was taken as £1.0M (2006 prices). This cost was taken from the current A1/ N1 Newry to Dundalk Link Road scheme, which is currently delivering single span overbridges for £500,000, and a £500,000 allowance has been included for the slip roads associated with a compact grade-separated junction.

The results of the test are presented in table 5.13.

Table 5.13: Summary of Economic Assessment for Roundabout verses At-grade Roundabout

Values in £'s (Discounted to 2002)	At-Grade Roundabout (Straight Through Flows-Only)	Grade-Separated Junction	Difference
Journey Time Benefits	£0	£1,637,840	£1,637,840
Estimated Cost	£356,004	£791,121	£435,117
Economic Benefit per Junction			£1,202,723
Total Economic Benefit (based upon 3 junctions)			**£3,608,169**

The analysis suggests that utilization grade separation would represent value for money, based on the junction costs assessed.

Given the robust nature of this result, and the early stage of assessment, it was deemed unnecessary to run an economic assessment based on accident costs for the different junction options. Generally, monetary accident benefits are significantly lower than the journey time benefits and so would probably not be a deciding factor in informing the junction strategy for the A26. In addition, it is generally accepted that the accident issues relating to junction design are that a grade-separated junction is inherently safer than an at-grade junction, so this would likely lead to an even better economic performance for the at-grade junction option.

Therefore, based upon the above analysis, for the purposes of estimating it was decided to cost the three intermediate junctions as compact grade-separated junctions. This assumption should be reviewed at stage 2 when junction strategy for the route would be defined.

The RSPPG guidance recommends against proving private access directly onto a category 5 dual carriageway. The design and assessment of the corridors for this stage 1 assessment has been based upon this assumption.

5.6 Conclusions

An analysis of existing and forecast future conditions was undertaken, and the following conclusions were drawn:

- from observation:
  - free flow traffic conditions on the northbound carriageway of the existing A26, at the change from dual to single carriageway, just south of the A26/ B26 junction (Station Road and Springmount junction/Glarryford Crossroads) are at times compromised because of the reduction of carriageway standard from D2AP to S2;
  - slow moving, large platoons of traffic are commonplace along the study area of the A26, predominantly because of high volumes of traffic, particularly during the peak hours, and because of the lack of safe overtaking opportunities to allow vehicles to pass slower-moving traffic; and
  - there appears to be relatively little delay to turning traffic at junctions.
- average 24 hour flows on the A26 are in the region of 15,500 to 18,500 vehicles per day, with the highest flows at the north end of the A26 study area;
- a number of long distance bus services stop on the A26 (at Killagan) and travel via the B94 (Drumadoon Road). These bus movements would need to be allowed for with any A26 improvement scheme;
- pedestrians and cyclists are not prevalent on the existing A26;
- comparison with national accidents rates shows that the A26 has an accident record which is typical of this type of principal road;
- shunt type accidents are the most common on the A26;

- an investigation of congestion reference flow (CRF) thresholds indicates that the existing A26 currently experiences a ration of flow to CRF of 88%. This is in excess of the 75% limit for journey time reliability and there is therefore evidence of congestion for the route;
- flows on the A26 have been forecast to be around 20,000 AADT in 2012, the notional year of opening, and 24,500 AADT in 2027;
- a CRF assessment for future flows indicates that for the existing A26, a ratio of flow to CRF of 96% would be achieved in 2012, which is approaching the absolute capacity for the route. By 2027, the existing A26 is predicted to have a ratio of flow to CRF of 116%, which is well in excess of its theoretical capacity limit, and is approaching the upper level (125%) for maximum driver stress.
- an investigation of the appropriate carriageway standard for year of opening flows suggests that a WS2 standard carriageway or an all-purpose dual carriageway standard carriageway would satisfy traffic demand within the study design period (to 2027), but beyond this, the WS2 option would begin to suffer from congestion and driver stress;
- the RSTN TP defines the standard of carriageway for the route upgrade as dual carriageway, therefore the decision to dual has been taken at Ministerial level. However, based upon a CRF assessment, upgrading the route to dual carriageway would appear to be the appropriate standard of carriageway; and
- the propsed dual carriageway has been assessed as a category 5 dual carriageway,. The RS PPG guidance recommends against proving private access directly onto a category 5 dual carriageway.

6 Consultation

6.1 Introduction

Consultation has played an important role in the development of route corridors during this stage 1 scheme assessment. Consultation has been undertaken with statutory consultees, key stakeholders, and the local community.

The approach to consultation during this early phase of project development focussed on early participation of all the consultees. This maximised the opportunities to capture key issues and concerns early enough in the process to assist in the development of potential solutions.

A primary aim of the consultation process has been to implement a community involvement process that complies with the provisions set out under *Planning Policy Statement (PPS): 1 General Principles (Northern Ireland),* recognising the importance of involving the public in the planning of projects.

The various consultation activities undertaken during the stage 1 scheme assessment are described in this section.

6.2 Consultation Objectives

The overall objectives of the consultation process for this scheme are:

- to seek local knowledge and information from the community which may assist in the planning and development of route corridors;
- to ensure potentially affected property owners, the local community and other interested stakeholders are provided with sufficient information about the scheme and the likely impacts so that they can provide informed input;
- to ensure appropriate and direct communication with property owners and land occupiers in relation to providing access for site investigations on land within the study area by study team members;
- to encourage community support and participation throughout subsequent phases of scheme development to facilitate better and more generally accepted outcomes;
- to provide a range of accessible opportunities for the community to contribute to the scheme;
- to build an ongoing relationship between the Roads Service, the study team and the community in order to gain long term support for the scheme; and
- to provide an effective, open and accountable process.

6.3 Key Consultation Activities

6.3.1 Roads Service Website

An A26 project portal is available on Roads Service website (*www.roadsni.gov.uk/A26Frosses*) and was established in June 2006 to keep the public and other interested stakeholders informed about key aspects and stages of scheme development. The website provides information about the scheme, including:

- general background information about the scheme;
- details of the first public exhibition held on 15th and 16th November 2006 at the Royal Fort Inn;
- copies of the display panels used for the first public exhibition event; and
- relevant contact details of the Roads Service.

The website is being maintained by the Roads Service throughout the duration of this project and will be progressively updated at key stages during the scheme development.

6.3.2 Public Exhibition No. 1 – Scheme Introduction

An initial public exhibition for the scheme was held on the 15th and 16th November 2006. The exhibition was held at the Fort Royal Inn, 146 Crankill Road, County Antrim. On the 15th November, the exhibition was staffed by eight key representatives of Roads Service and the study team. The exhibition was opened for public viewing between the hours of 2.00pm and 10.00pm. The second day of the exhibition operated as an unmanned, static display with doors opened to public from 9.00am to 5.30pm.

The primary purpose of the exhibition was to introduce the scheme and the study team, provide some initial background information about the scheme, present some of the key engineering and environmental constraints identified during the initial project familiarization stages of the study, outline the formal study process and key timings, and to describe the consultation process. The eight representatives from Roads Service and the study team were available to the public during this forum to take questions and provide answers and clarification on any issues raised, as far as practicable.

The exhibition presented a series of large-scale display panels and graphics (four in total) as follows:

- **Panel 1 -** Background. This panel provided an introduction to the scheme, detailing the current status of the project and establishing the need for scheme development.
- **Panel 2 -** Engineering Constraints. This panel presented a plan showing the locations of engineering constraints within the study area.
- **Panel 3 -** Environmental Constraints. This panel presented a plan showing the environmental constraints within the study area.
- **Panel 4 -** What Happens Next. This panel provided an overview of the study process and the key steps to project delivery. The process was illustrated on a process diagram. Information about how to keep involved and relevant contact details were also provided.

Approximately 200 people attended the opening day of the public exhibition, with the majority of people drawn from within the study area. A number of representatives from key stakeholder groups, local interest groups, and local councillors also attended.

To maximise opportunities for the capture of community views and concerns, a number of break-out areas were set up adjacent to the main display area These allowed for one-to-one discussions about the scheme with members of the study team. Furthermore, those attending were actively encouraged to record their comments in comment books available on the day.

6.4 Key Issues of Concern Raised by the Community

During and following the first public exhibition a number of comments were received from members of the public and other interested stakeholders. The comments received were collated and reviewed from the following sources:

- comment books made available at the public exhibition venue;
- formal letter submissions; and
- telephone calls to the Roads Service.

Table 6.1 summarises the top 20 comments received during the stage 1 scheme assessment work.

Table 6.1: Key Issues of Concern Raised by the Community

	Description	Number of Comments	% of Total
1.	Support for extending scheme to tie in with Dunloy Cross	7	8%
2.	Frustration due to hassle associated with upgrade of road at Dunloy Cross	1	1%
3.	Need to upgrade Clogh/Glarryford Crossroads	1	1%
4.	Impact on property and/or land	17	20%
5.	Impact on business (excluding farms)	4	5%
6.	Compensation (where specifically mentioned)	4	5%
7.	Severance issues (where specifically mentioned)	6	7%
8.	Replacement dwellings in event of property being lost	2	2%
9.	Need to improve road for safety reasons	7	8%
10	Need for improvement to road for economic reasons	1	1%
11	Environmental Impacts including water, wildlife, countryside, and noise	7	8%
12	Letter of invitation not received	7	8%
13	Concern over traffic during construction	2	2%
14	Provision for pedestrians and cyclists	1	1%
15	Support for park and ride along alignment	1	1%
16	Suggested viaduct to cross bog	1	1%
17	Support for the scheme (general)	8	9%
18	Support for central alignment	5	6%
19	Support for eastern alignment	0	0%
20	Support for western alignment	4	5%
	Total No.	86	

Furthermore, a standard letter has been received from 37 concerned parties within the study area raising the following issues:

- general acceptance surrounding the need for the scheme;
- development of a route to the west of the existing A26 would result in fewer property impacts and loss of good quality agricultural land;
- development of an online route would be accepted by the majority of affected landowners and residents; and
- development of an eastern route would be rigorously challenged through all appropriate legal channels.

The justification for the above comments was largely based on the following factors:

- loss of good quality agricultural land;
- severance and impacts to farming properties;

- restricted property access;
- community severance;
- impacts on local landscape character and visual intrusion;
- impacts on property values;
- disturbance to nature conservation interest and local wildlife; and
- increased traffic noise levels.

6.5 Stakeholder Consultations

6.5.1 Consultees Approached

The following statutory and non-statutory consultees were contacted during the stage 1 scheme assessment process:

- Department of Environment (DoE)
  - Planning Service – Landscape Architects Branch
  - Environment and Heritage Service (EHS) - Natural Heritage;
  - EHS Built Heritage - Environmental Protection;
  - EHS Built Heritage - Water Management;
  - EHS Built Heritage - Historic Buildings;
  - EHS Built Heritage - Monuments and Buildings;
- Department of Agriculture and Rural Development (DARD)
  - Rivers Agency - Lisburn and Central office;
  - Environmental Policy Branch;
  - Countryside Management Division;
- Department of the Environment;
  - Local Environmental Issues Division;
  - Environmental Policy Division;
- Ballymoney Borough Council - specifically on noise and air quality issues;
- Ballymena Borough Council - specifically on noise and air quality issues;
- Ulster Wildlife Trust;
- Royal Society for Protection of Birds (RSPB), NI;
- Department of Culture, Arts and Leisure (DCAL) - Inland Fisheries/Waterways; and
- Geological Society of Northern Ireland.

The assistance of these organisations is gratefully acknowledged.

6.5.2 Consultation Process

A series of initial letter requests were sent to a number of relevant government agencies and key stakeholders listed in Table 6.2 below. The principal purpose of these letter requests was to obtain relevant background data and information on key environmental attributes located within and surrounding the study area, and to seek advice on the key environmental constraints and areas of potential environmental sensitivity. These initial letter requests were followed by a series of individual meetings and a number of direct telephone discussions or email correspondence, as appropriate.

6.5.3 Main Issues Raised

Table 6.2 presents a summary of the main issues raised by relevant government agencies and other key stakeholders during the initial consultations undertaken as part of the stage 1 scheme assessment work.

Table 6.2: Key Stakeholder Concerns

Stakeholder Group	Key Issues Raised
Department of Environment	
Planning Service – Landscape Architects Branch	Concerns over the integration of the road into the existing landscape. Extent of visual intrusion associated with a new off-line road. Loss and alteration of local landscape features and impacts on landform, vegetation cover, watercourses and settlement areas. Concerns over potential obstruction, concealment and exposure in views both within and outside of the study area.
Environment and Heritage Service - Natural Heritage	Concerns over the physical and environmental impacts on protected nature conservation sites such as the Main Valley Bogs SAC, a European protected site, and the Frosses Bog ASSI, a nationally protected site. Loss of habitats of importance to European / UK protected fauna species such as otter and the whooper swan. Potential impacts on the hydrological connectivity between Dunloy Bog, Caldanagh Bog, and Frosses Bog which form the Main Valley Bogs SAC. Key issues of concern relate to altered land drainage patterns, drying out of the bogs and/or sedimentation of the bogs due to road embankment construction, road runoff impacts and ground settlement.
Environment and Heritage Service - Built Heritage	Concern over potential impacts of the appearance and setting of listed buildings within the study area. Consideration of areas that could potentially contain buried / in-situ archaeological remains.
Environment and Heritage Service – Water Management Unit	Concerns of potential pollution of watercourses. Appropriate pollution prevention measures for silt, oil and concrete would be required during construction. WMU would like to see a minimum number of river crossings, using smaller bridges over smaller rivers and incorporation of SUDS drainage systems into the design. If SUDS installed early on, can provide pollution prevention – drainage to settlement ponds & provides habitat creation EHS are preparing pollution reduction programmes for all named rivers – of which the River Main catchment will have 6 basin areas
Local Councils	
Ballymena / Ballymoney District Councils	Road construction activities are to comply with construction noise levels set in BS 5228: 1997.

Ballymena Borough Council **EHO**	The existing A26 straddles two local authority areas – Ballymoney and Ballymena .Within the Ballymoney boundary, there are approximately 12 houses located along the road, there is probably less on the Ballymena Boundary. Concerns exist over potential noise and air quality deterioration. Advised that an assessment of the NI air quality objectives would be required, and noise and dust nuisance would require consideration. It would be expected that relevant British Standards and good practice guidance would be adhered to.
Ballymoney Borough Council **EHO**	Concerns over the impacts of any road improvement scheme on the existing properties adjacent to the route corridors. Aware that level of impact would depend on traffic flows, the specific route alignment and the number and location of any junctions proposed.
Department of Agriculture and Rural Development	
Rivers Agency	Crossing of designated watercourses. Infilling on the River Main floodplain and potential loss of flood storage areas and increased flood risk to adjoining lands within the River Main catchment area. Compensatory excavation or the creation of new flood storage areas at least equal to that lost by any infilling on the floodplain. Consents required by the Rivers Agency under Schedule 6 of the *Drainage (Northern Ireland) Order 1973* for any works carried out on, within, over and under a watercourse and/or for any discharge to a watercourse. A flood risk assessment (FRA) will be necessary for all watercourses potentially crossed or affected by the proposed scheme. The FRA should be prepared in accordance with the provisions of *PPS 15: Planning and Flood Risk*. Rivers Agency only has statutory powers relating to the river channel works.
Environmental Policy Branch	Countryside Management: Impacts on field boundaries and heritage features which are important components of the farmed landscape. Care to be taken with the management and disposal of spoil from excavation works, in particular to avoid disposal on valuable habitat areas. Avoid development within classified nitrate vulnerable zones, where practicable. Avoid areas infested by potato cyst nematode – the management of soil or other materials from these lands is prohibited except under licence.
Department of Culture, Arts and Leisure	
Inland Fisheries	River Main is an important recreational fishing river and contains spawning grounds for salmon and trout. Salmon is an endangered species listed under the EC Habitats Directive 92/43/EC. Appropriate pollution prevention measures will need to be implemented during road construction to minimise the potential impacts on the water quality of local watercourses due to an influx of

	sediment laden runoff and other contaminated runoff. DCAL would like to see the rivers not constricted by river crossings. There should be no piped areas or culverts. Essentially, there is an aspiration to minimise construction on or near the rivers. If crossings have to be built, the bridges should be constructed well back from the watercourses. All inverts at new bridge structures should be designed to be fish friendly, particularly as the River Main is a salmonid fishery.
Geological Society of Northern Ireland	Concern over potential impacts on private water supplies.
RSPB Northern Ireland	Main concerns related to potential impacts to breeding birds, in particular, lapwings, and hen harriers which may be found in the area.

7 Route Improvement Strategies

7.1 Introduction

There are numerous methods which could be implemented to upgrade the A26 from a single carriageway (S2) to a dual carriageway standard (D2AP) highway between Glarryford and the A44 Drones Road junction. This chapter discusses the widening methods available for delivering a dual carriageway.

The area through which this section of the A26 passes is of rural character with relatively few residential properties in the vicinity of the road. Opportunities exist for both on and off-line widening solutions to the A26 route. There are essentially three route improvement assessment areas available for improving the A26 route. These are:

- off-line widening to the west (western corridors);
- improving the existing A26 route through on-line widening techniques (central corridors); and
- off-line widening to the east (eastern corridors).

Each of these route improvement assessment areas is illustrated on drawing number A26-HWY-004, in Appendix A.

Each of the assessment areas has been assessed and a number of potential route corridors developed. These are discussed in this chapter.

7.2 Route Improvement Techniques

There are four techniques available for improving a single carriageway highway to dual carriageway standard. These are as follows:

7.2.1 Parallel Improvement to D2AP

The most simple technique for improving an S2 carriageway to D2 standard is to construct a new parallel carriageway adjacent to the existing carriageway to form half of the new D2, and then improve the existing carriageway to form the other half of the D2. The choice of which side of the existing road the new carriageway is constructed can be based upon constraint avoidance.

This methodology has the benefit of providing a degree of flexibility during construction in terms of traffic management. For example, while the new carriageway is being constructed, road traffic can continue to use the existing road, albeit under potentially controlled (reduced speed) conditions. Once the new carriageway is operational, traffic can then be diverted across onto it and the existing carriageway can then be improved to complete the D2 carriageway.

A variation of the parallel improvement would be where an over-widened central reserve might be applied. This may be appropriate to accommodate carriageways at different levels (split carriageways), or to potentially avoid a constraint between the carriageways.

7.2.2 Constrained Improvement to D2AP

The simplistic methodology of parallel improvement works well for greenfield sites with no constraints, or constraints only on a single side of the existing road, but where pinch-points exist, with constraints on both sides, the principle can not be applied. In these constrained situations, the widening technique is limited to making the best use of the space available.

This form of improvement would allow flexibility to align the route to best fit through a constrained area. However, application of this method of improvement would require high levels of traffic management.

7.2.3 Off-Line Dualling Close to the Existing Road

Off-line dualling close to the existing road is the provision of a complete new dual carriageway closely adjacent to the existing road. The existing road would remain as S2 standard and has the potential for use as a local distributor.

This route improvement strategy might be appropriate for sections where constraints such as residential properties might require access arrangements, which could be provided by the remaining existing road. This technique might also be appropriate for limited sections of route improvement where constraints on either side of the existing road make it impossible, or impractical, to utilise the the existing carriageway as half of the new dual carriageway.

7.2.4 Off-Line Dualling Away from the Existing Road

Off-line dualling away from the existing road is the provision of a complete new dual carriageway completely off-line and independent of the existing road. The existing road would remain as S2 standard and has the potential for use as a local distributor.

This route improvement strategy provides the opportunity for minimising traffic disruption during construction as the construction of the new duall carriageway is independent of the existing road. Traffic management might only be required during construction of the tie-ins.

The available methods of delivering a D2AP standard road are presented on drawing number A26-HWY-003 (Appendix A).

7.3 Western Corridors

7.3.1 Overview of the Western Route Improvement Assessment Area

The western route improvement assessment area can be largely characterised as low grade agricultural land which forms the floodplain for the River Main valley. The river runs roughly parallel to the existing A26 at an offset distance of between approximately 400m and 700m to the west. Further to the west of the A26 is the Belfast to Londonderry/ Portrush railway line, which also runs roughly parallel to the existing A26, at an offset distance to the west of between 1.2km and 1.5km.

The western assessment area includes relatively few isolated residential properties, and these are largely located adjacent to the B93 (Killagan Road), which runs diagonally through the area on a south-west to north-east orientation.

The floodplain associated with the River Main is substantial, and a large proportion of the western route improvement assessment area has been established as part of the river's 1 in 100 year flood inundation area.

Six western corridors have been developed. These can be seen on drawing number A26-HWY-005, in Appendix A. The corridors are described as follows.

7.3.2 Western 1 Corridor

The Western 1 Corridor seeks to deliver a complete off-line dualling scheme, capitalising on what immediately appears to be low value, undeveloped land to the west of the existing A26. This corridor seeks to divert the A26 off-line to the west immediately north of the Glarryford Crossroads, maximising the amount of off-line construction, and hence minimising the impact to the existing road, during construction of the scheme. The corridor traverses a small area characterised by drumlins before crossing the flat low-lying River Main valley. The corridor seeks to avoid any impact to the Frosses Bog ASSI, which results in the alignment crossing the River Main to the south-west of the ASSI to ensure separation between the road and the environmental feature. The corridor has been routed to the west, to within 400m (approximately) of the Belfast to Londonderry/ Portrush railway line, to provide some separation between the new road corridor and the River Main. This corridor is forced significantly off-line in relation to the existing A26 by avoiding this environmental constraint, and at the most extreme point lies about 900m west of the existing road.

The corridor requires two crossings over the River Main, and requires a new junction with the B93 (Killagan Road), in the vicinity of the existing River Main crossing.

To the north of the B93 (Killagan Road) the corridor rejoins the existing A26 at a new junction with the A44, passing through an area containing the River Main, Killagan Water, and numerous minor watercourses.

This corridor has a major benefit as the new road would be aligned away from existing residential properties and farm buildings in most instances. However, as the corridor is almost wholly greenfield construction, the scheme would require a significant amount of land to be acquired through compulsory purchase.

7.3.3 Western 2 Corridor

The Western 2 Corridor is essentially the same corridor as Western 1 with a variation at the southern end of the scheme through the River Main floodplain. This corridor seeks to minimise the impact upon the 1 in 100 year flood inundation area for the River Main.

From the Glarryford junction, this corridor delivers an on-line widening solution to a point in the vicinity of the existing petrol filling station to the south of the Frosses Trees. At this point the alignment curves to the west, bisecting an area of higher ground, before crossing over, to the west of, the Western 1 Corridor coming to within 200m (approximately) of the Belfast to Londonderry/ Portrush railway line. This corridor then curves clockwise and joins the same alignment as with Western 1. Western 2 reduces the length of alignment passing through active floodplain by over 500m.

This corridor avoids any direct impact to the Frosses Bog ASSI, but passes within 20 to 30m of the environmental feature.

7.3.4 Western 3 Corridor

The Western 3 corridor provides the shortest corridor to be assessed. The corridor approximates to a straight line from the Glarryford junction to the Logans retail facility, with a deviation to the west to pass behind residential properties adjacent to the existing A26, before curving to the east to form a new junction with the existing A26 and the A44 Drones Road.

As with the Western 2 Corridor, it is largely an off-line solution, which benefits the constructability of the scheme and minimises traffic disruption during construction. The only section of on-line widening would be to the southern end of the scheme, for approximately the first 1km. The corridor would then deviate to the west in advance of the Frosses Trees.

A major disadvantage of this corridor is that it routes directly through the Frosses Bog ASSI. This particular ASSI forms part of the Main Valley SAC, which is a site of international environmental importance (previously described in section 4.6.1.1). In this instance it is unlikely that environmental impacts could be mitigated and any impact to this SAC is likely to receive major environmental objection from the EHS.

7.3.5 Western 4 Corridor

The Western 4 corridor is essentially the same corridor as Western 3, but benefits from avoiding direct impact upon the Frosses Bog ASSI.

From the Glarryford junction, the corridor follows the existing A26 route and delivers the dualling by on-line widening techniques up to a point in advance of the southern Frosses Trees. Depending upon how the corridor would deal with the Frosses Trees, a range of widening techniques are available. Immediately past the trees, the corridor deviates to the west and joins the same corridor as Western 3.

7.3.6 Western 5 Corridor

This corridor utilises a greater proportion of on-line dualling for the southern section of the scheme, before routing to the west and delivering an off-line solution for the northern end of the scheme.

From the Glarryford junction, the corridor follows the existing A26 route and delivers the dualling by on-line widening techniques up to a point in advance of the Frosses Trees. Depending upon how the corridor would deal with the Frosses Trees, a range of widening techniques is available through the trees. The corridor returns to the existing A26 in the vicinity of the Lisnasoo Road junction.

Approximately 300m north of the Lisnasoo Road junction the corridor gently deviates off-line to the west. The routing takes the corridor behind (to the west) of the roadside residential property 800m south of the Lisnasoo Road junction, avoiding any direct land-take from this property. The

corridor traverses a roughly straight line passing behind (to the west of) several residential properties along the line of the existing A26 until it passes immediately to the west of the Logans retail facility, and rejoins the alignment of the Western 4 corridor, which is described in section 7.3.5.

7.3.7 Western 6 Corridor

The Western 6 Corridor would almost wholly utilise the existing A26 corridor. The only deviation to the existing A26 route is to the north of the Logans retail facility.

From the Glarryford junction, the corridor follows the existing A26 route and delivers the dualling by on-line widening techniques up to a point in advance of the Frosses Trees. Depending upon how the corridor would deal with the Frosses Trees, a range of widening techniques is available through the trees. The corridor returns to the existing A26 in the vicinity of the Lisnasoo Road junction.

Past the Lisnasoo Road junction (heading north), the corridor remains more central to the existing route for approximately the next kilometre. Through this section there are isolated residential properties on both sides of the A26, and it is likely that widening of the carriageway would affect at least one of the properties.

The alignment of the existing A26 contains a radius which, in relation to the proposed design speed for the improved carriageway, would be too tight for the proposed dualling scheme to follow. Therefore, in the vicinity of the crossing of Cloghmills Water, the proposed corridor needs to come off-line to smooth out this tight radius by cutting the corner. In doing this, the corridor will depart from the existing A26 over a distance of approximately a kilometre before rejoining and forming an on-line widening solution once more in advance of the B94 (Drumadoon Road) junction.

Once past the Logans retail facility, the corridor moves off-line to the west to avoid the roadside residential properties down both sides of the existing A26. The new corridor passes behind the properties, and rejoins the existing A26 at the junction with the A44.

7.4 Central Corridor

7.4.1 Overview of the Central Route Improvement Assessment Area

The central route improvement assessment area contains the existing A26, and any central corridor would seek to maximise the use of the existing highway infrastructure and build upon the already established highway corridor through the study area.

The existing A26 bisects the poor quality agricultural land to the west and the good quality agricultural land to the east. The existing route lies largely away from the River Main flood plain.

Several residential and farm properties with numerous private vehicular accesses join the existing A26 throughout the length of the study area and the Central Corridor would need to cater for these existing highway links.

7.4.2 Central Corridor

The Central Corridor seeks to maximise the use of the existing A26 highway corridor.

From the Glarryford junction, the corridor follows the existing A26 route and delivers the dualling by on-line widening techniques up to a point in advance of the Frosses Trees and depending upon how the corridor would deal with the Frosses Trees, a range of widening techniques is available through the trees. The corridor returns to the existing A26 in the vicinity of the Lisnasoo Road junction.

Past the Lisnasoo Road junction (heading north), the corridor remains more central to the existing route for approximately the next kilometre. Through this section there are isolated residential properties on both sides of the A26, and it is likely that widening of the carriageway would affect at least one of the properties.

The alignment of the existing A26 contains a radius which, in terms of design standards, would be too tight for the proposed dualling scheme to follow. Therefore, in the vicinity of the crossing

of Cloghmills Water, the proposed corridor needs to come off-line to smooth out this tight radius by cutting the corner. In doing this, the corridor departs from the existing A26 over a distance of approximately a kilometre before rejoining and forming an on-line widening solution once more in advance of the B94 (Drumadoon Road) junction.

From here the corridor remains more central to the existing route to where it forms a junction with the A44 Drones Road. However, the section of highway between the B94 (Drumadoon Road) and the A44 junction contains several roadside residential properties on both sides of the road, and it is likely that at least one property will be affected over this section if this corridor were implemented.

The Central Corridor has significant benefits in that it largely involves on-line widening of the existing highway, and this minimises the amount of new land required. However, construction of this corridor involves significant traffic management issues, and major delays during construction would likely result.

As discussed in Section 7.2, there is a range of widening techniques with which the Central Corridor could be delivered. If taken forwards to stage 2, these widening techniques would be investigated further.

7.5 Eastern Corridors

7.5.1 Overview of the Eastern Route Improvement Assessment Area

The eastern route improvement assessment area benefits from significantly improved ground conditions than the western and central assessment areas. The eastern assessment area is characterised by a hilly topography formed from a series of substantial drumlins. The land is of higher farming and agricultural quality and there are a number of farms populating the area.

The village of Clogh Mills is located mid-way along the route, at an offset of approximately 1.2km to the existing A26.

7.5.2 Eastern 1 Corridor

The Eastern 1 Corridor seeks to maximise the opportunity for an off-line solution, whilst balancing the need to minimise direct impact to farm buildings along the corridor.

From the Glarryford junction, this corridor initially utilises the existing A26 carriageway, and seeks to apply on-line widening to a point in advance of the Frosses trees. The corridor then diverts off-line to the east to run close, and parallel, to the Old Frosses Road.

The corridor intersects with Lisnasoo Road, and some form of junction would be provided. The corridor continues northwards crossing Cloghmills Water before reaching the B94 (Drumadoon Road), where another junction would be required. The corridor then crosses Mount Hamilton Road, where another junction potentially might be required, depending upon junction strategy.

The corridor then rejoins the existing A26 at a new junction with the A44, passing through an area occupied by the fields of several small farms.

This corridor would be unlikely to directly affect any residential properties or farm buildings. The engineering quality of the land is significantly better than that for both the Western and Central Corridors. This would be likely to reduce costs for importing material.

This corridor has a major benefit as the new road would be realigned away from existing residential properties and farm buildings in most instances. However, as the corridor would be almost wholly greenfield construction, the scheme would require a significant amount of land to be acquired through compulsory purchase. Furthermore, the farming quality of the land is considered good and, combined with the significant farm severance issues associated with this corridor, there is likely to be a significant impact on the many farms which populate the eastern assessment area.

7.5.3 Eastern 2 Corridor

This corridor is similar in principle to the Eastern 1 Corridor, in that it offers an off-line corridor to the east, but departs from the existing A26 route further north than with the former corridor.

From the Glarryford junction, the corridor follows the existing A26 route corridor and delivers the dualling by on-line widening techniques up to a point in between the two sets of Frosses Trees.

The corridor deviates to the east and passes through the open farm land in a north-east direction, avoiding farm properties. The corridor passes over the Cloghmills Water and rejoins the corridor alignment as with Eastern 1.

This corridor is likely to have the greatest impact upon the working farms to the east of the A26 because of its greater potential for land severance.

7.5.4 Eastern 3 Corridor

The Eastern 3 corridor is based upon a similar strategy to Eastern 2. The main difference being that Eastern 3 would depart from the existing A26 route at a point further north, in the vicinity of the Lisnasoo Road junction.

Past the Lisnasoo Road junction the corridor deviates to the east and passes through open farm land in a north-east direction, avoiding farm properties. The corridor passes over the Cloghmills Water and rejoins the corridor alignment as with Eastern 1.

As with the Eastern 2 Corridor, this corridor would be likely to have a significant detrimental impact upon the working farms to the east of the A26 because of its greater potential for land severance.

7.6 Hybrid Corridors

7.6.1 Overview of Hybrid Corridors

The ten basic corridors discussed so far have concentrated upon delivering a corridor through a combination of utilising the existing route corridor, combined with variations of off-line routes wholly to one side or the other of the existing route. There is also the potential for corridors to cross over from one side to the other.

This section examines the opportunities for implementing hybrid corridors.

7.6.2 East-West Corridor

This corridor provides a hybrid corridor linking the previously described corridors (from south to north) of Eastern 1 (off-line to the east) with Western 1 (off-line to the west).

From the Glarryford junction, this corridor utilises the Eastern 1 route for the first 5.5km (approx), to where the corridor crosses Cloghmills Water. At this location the corridor deviates to the northwest and diagonally cross the existing A26 immediately to the north of the existing A26 junction with the B93 (Killagan Road). The corridor then joins the northern section of the corridor previously described for the Western 1.

This corridor would deliver a wholly off-line solution which would be of benefit in terms of traffic management during construction. The scheme would benefit from utilising the poor quality agricultural land to the west for the majority of the corridor, but would impact upon good quality agricultural land to the north of the corridor.

7.6.3 West to East Corridor

The West to East corridor links the previously described corridors of Western 5 with Eastern 1.

From the Glarryford junction, this corridor utilises the Western 5 for the first 5km (approx), up to a point approximately 700m in advance of the B94 (Drumadoon Road) junction. The corridor then deviates to the northeast and diagonally across the existing A26 immediately to the south of the junction with the B94 (Drumadoon Road). The corridor then joins that previously described for the northern section of the Eastern 1 before forming a junction with the A44 Drones Road.

This corridor would deliver a wholly off-line solution which would be of benefit in terms of traffic management during construction.

7.7 Initial Corridor Assessment

7.7.1 Initial Appraisal

An initial appraisal of the twelve corridors has been undertaken to identify the most sensible, robust corridors for more detailed consideration. Based upon a coarse assessment, considering the main constraints and issues associated with the study corridor, six corridors have been rejected as either unfeasible, too environmentally damaging, or resulting in unacceptable impact on the local community. The remaining six corridors were considered to be worthy of a more detailed assessment. The coarse corridor appraisal is summarised below.

7.7.2 Corridors to be Rejected

Corridors that have been immediately rejected, together with the reasons for rejection are as follows:

- *Western 1*. This corridor would result in a significant impact to the 1 in 100 year flood inundation area for the River Main. When compared to Western 2, an additional 1.5km of the route passes through the assessed flood inundation area. This would result in a significant impact to the flood plain. This would be against the guidance set out in Planning Policy 15, which states no development should be create a direct threat to flooding, nor should it increase the risk of flooding elsewhere. Even if the Policy issues could be resolved, significant flood compensation storage areas would be required. This would prove difficult to achieve given the flat nature of the valley bottom and the environmental sensitivity of the area. It was therefore decided that this corridor should be rejected in favour of Western 2 which has much reduced impact upon the flood plain;
- *Western 3*. This corridor has been rejected because its route passes directly through the Frosses Bog ASSI. Frosses Bog forms part of the Main Valley SAC, which is an internationally important environmental site. Any corridor resulting in a direct impact to the Frosses Bog would be strongly opposed by the EHS, and approval for such a corridor would be highly unlikely. This corridor has therefore been rejected on these environmental grounds;
- *Western 4.* This corridor passes directly through the Frosses North SLINCI, which is a site of local environmental significance. The route also impacts along the edge of the 1 in 100 year flood inundation area and passes through the flood plain on two occasions. Flood compensation storage areas would be required for any areas of land lost within the flood plain, and this would be difficult to achieve for this corridor, given the flat nature of the valley bottom. In addition, just north of the Lisnasoo Road junction, the route of this corridor passes close to the west of a chicken farm and a collection of farm properties. This could potentially create an 'island' situation for these properties, resulting in them becoming sandwiched between the existing A26 and the proposed corridor. Visually, this alignment would be on embankment for a considerable length and being close to residential properties would be visually unattractive in the flat landscape. It has been considered that in assessing the western corridors, this corridor should be rejected in favour of the Western 5 because the latter corridor results in less environmental impact and less direct impact upon the chicken farm and the farm buildings;
- *Eastern 2*. In developing corridors for the eastern corridor, an over-riding aim has been to minimise the direct impact to residential properties and farm buildings. The second consideration was to minimise the loss of the agricultural land between the properties and farm buildings. Eastern 2 was developed as an alternative to Eastern 1, but it is considered that this corridor would result in unacceptably large areas of agricultural land becoming severed, and would result in an unacceptable impact to the farming community to the east of the existing A26. It is considered that Eastern 3 offers no advantages over Eastern 1, and has been rejected on the grounds of impact to the good quality farming land;

- *Eastern 3.* This corridor has been rejected for largely the same reasons as Eastern 2; i.e. a large negative impact to the farming community to the east of the existing A26. However, in addition, this corridor involves only one half of the corridor being off-line. Therefore, much of the acknowledged benefits of off-line construction would be lost when compared with Eastern 1. For these reasons, Eastern 3 has been rejected and Eastern 1 is the preferred eastern corridor to be assessed in greater detail;
- *West to East Corridor.* This corridor has been rejected because there is no perceived benefit to move from the western side of the A26 (where the alignment sits on poor quality agricultural land) to the east, and utilise good quality agricultural land for the road construction, when remaining in the western side is a feasible corridor.

7.7.3 Corridors to be Taken Forward

The six corridors that have been considered worthy of more detailed Stage 1 assessment are as follows. These can be seen on drawing number A26-HWY-006, in Appendix A.

- Corridor 1 – Western 2;
- Corridor 2 – Western 5;
- Corridor 3 – Western 6;
- Corridor 4 – Central;
- Corridor 5 – Eastern 1; and
- Corridor 6 – East-West.

A Stage 1 Assessment, using the WebTAG assessment methodologies, has been undertaken for these six corridors and is presented in the following chapters.

8 Assessment Methodologies

8.1 Introduction

This Stage 1 Scheme Assessment has been undertaken using the *New Approach to Appraisal (NATA)*, which is the recommended basis for the appraisal of road schemes throughout the UK. Throughout the NATA process, the Government's five objectives are the central criteria against which the schemes should be assessed. The five objectives are:

- environment,
- safety,
- economy,
- accessibility, and
- integration.

The assessment of each of these objectives has been undertaken using guidance set out in the Department for Transport's (DfT) web-based *Transport Analysis Guidance (WebTAG)*, which provides guidance for the assessments of objectives. It sets the context for the assessment process and provides a structured assessment framework to enable comparison between competing corridors. The specific methodologies used for the process of this assessment are set out in this chapter.

8.2 Environment Objective - Assessment Methodology

8.2.1 Overview

The baseline conditions for this Stage 1 Scheme Assessment were derived largely from a desktop assessment of relevant published data and supplemented, where appropriate, by preliminary environmental surveys for ecology, noise and landscape and visual assessment.

In accordance with the methodologies set out in DMRB Volume 11: Environmental Assessment, a stage 1 scheme assessment requires, "*sufficient assessment to identify the environmental advantages, disadvantages and constraints associated with broadly defined route corridors"*. The stage 1 scheme assessment report, "*should be a summary of the results of the assessment of route corridors giving greatest weight to any significant impacts identified"*.

WebTAG prescribes a multi-criteria assessment and provides methodologies to enable the assessment to be undertaken. The Stage 1 environment assessment covers the following ten environmental topics:

- noise,
- local Air Quality,
- greenhouse Gases,
- landscape,
- townscape,
- biodiversity,
- heritage of Historic Resources,
- water Environment,
- physical Fitness, and
- journey Ambience.

8.2.2 Information Collation and Review

A desk-based analysis was conducted involving the collation of relevant and available published information from key government agencies, local councils, and other stakeholders to the scheme. Information was obtained on land use, biodiversity, water features and flood risk,

ground conditions, cultural heritage, landscape, and visual amenity and the local climate. This exercise enabled key environmental constraints to be identified and mapped. This information has been collated using GIS software.

8.2.3 Constraints Identification and Mapping

Environmental constraints mapping has been produced to assist with the route corridor identification and assessment process. The constraints map was produced using the following information:

- 1:50,000 scale ordnance survey maps produced by the Ordnance Survey of Northern Ireland;
- aerial photography that was obtained in 2004;
- records held by the DoE - EHS in relation to designated statutory and non-statutory nature conservation sites, listed buildings and ancient monuments, water quality etc;
- records held by the DARD - RA for flooding, gauging stations and river flows;
- records held by the DARD for agriculture land quality, inland fisheries, and private woodlands;
- climatic data held by the Met Office for the Ballypatrick monitoring station;
- local area plans held by Ballymena and Ballymoney Borough Councils; and
- other relevant published reports and mapping data.

The principal environmental constraints identified within, and immediately surrounding, the study area are shown on drawing number A26-ENV-004 (Appendix D).

8.2.4 Consultation and Scoping

Relevant statutory and non-statutory consultees were contacted during the stage 1 scheme assessment process. This is discussed in section 6.5.1.

8.2.5 Environment Assessment Methodologies

The following sections explain how the methodologies for stage 1 scheme assessment prescribed under *DMRB Volume 11: Environmental Assessment* have been applied to this study.

8.2.5.1 Noise and Vibration

The approach adopted for the consideration of noise issues as part of the stage 1 scheme assessment work has largely followed the methodologies set out under DMRB Volume 11 (Section 3, Part 7). This has principally involved:

- a review of available literature for the study area. The data sourced from this exercise was collated and used to provide background acoustic information on the local rural environment and to identify potential noise producing activities and noise sensitive receivers;
- identification and calculation of the numbers and locations of noise sensitive receptors (i.e. residential properties), within defined distance bands extending at 50m intervals up to a distance of 300m either side of the existing A26 and scheme proposals under consideration that may experience a 25% increase or decrease in traffic volumes;
- a review of preliminary forecast traffic flows;
- preliminary site inspections to validate the existing settlement and land use patterns, terrain characteristics, local road network, and extent of vegetation cover within the study area;
- a preliminary ambient noise survey (daytime only) to record selective noise readings from various points around the study area so as to better understand and profile the ambient noise conditions; and

- identification of the potential for discernible changes in traffic noise across the local road network and associated with the development of scheme upgrade corridors. Comparison of the ambient year with the year of maximum traffic flow within 15 years of opening was then undertaken as the assessment criteria.

8.2.5.2 Air Quality

The approach adopted for the consideration of air quality issues as part of the stage 1 scheme assessment work has largely followed the methodologies set out under DMRB Volume 11 (Section 3, Part 1). This has principally involved:

- a review of existing air quality in the study area. This was based on available and published literature, database and website searches, identification of activities within or surrounding the study area that contribute to local atmospheric emissions, and to identify potential sensitive receptors;
- a review of the *Stage 1 and 2 Review and Assessment of Air Quality report* for the Ballymena and Ballymoney Borough Council Areas;
- identification of the key airborne pollutants that are likely to result from the scheme proposals;
- identification and calculation of the numbers and locations of air quality sensitive receivers (i.e. residential properties) within defined distance bands extending at 50m intervals up to a distance of 200m either side of the existing A26 and the scheme proposals that may be sensitive to changes in air quality;
- preliminary site inspection to validate the settlement and land use pattern, terrain characteristics, local road network, extent of vegetation cover within the study area;
- a review of meteorological data supplied from the nearest Met Office monitoring stations; and
- identification of the potential for discernible changes in local air quality due to the scheme proposals.

8.2.5.3 Greenhouse Gases

The approach adopted for the consideration of greenhouse gas issues as part of this assessment work has involved a desktop, qualitative review of relevant policy and guidance on climate change in Northern Ireland. The relevant guidance used included *Preparing for A Changing Climate in Northern Ireland (DOE, 2007)* and the *Greenhouse Inventory Report (AEA Technology, 2005),* and other relevant database and website searches.

8.2.5.4 Landscape

The approach adopted for the consideration of landscape issues as part of the stage 1 scheme assessment work has followed the methodologies set out under DMRB Volume 11 (Section 3, Part 5) and has also considered the Guidelines for Landscape and Visual Impact Assessment (2nd Edition) published by the Landscape Institute and the Institute of Environmental Management and Assessment 2002. This has principally involved:

- a review of relevant published information such as *The Northern Ireland Landscape Character Assessment (NILCA, 2000),* OS mapping and aerial photography;
- consultations with the DOE Planning Service – Landscape Architects Branch to establish the location of all designated areas of landscape importance and to discuss key issues to be addressed as part of the preliminary landscape assessment;
- definition of the visual study area (likely to be coincident with the zone of visual influence (ZVI), identification of potential landscape designations or protection areas, description of local character and quality of the landscape attributes or values, and visual setting within the study area;
- preliminary landscape survey to identify the main views of the study area and strategic local viewpoints affected, together with important landscape features. This fieldwork

was conducted in accordance with the *Guidelines for Landscape and Visual Assessment (Second Edition, 2002)* produced by the Landscape Institute and the Institute of Environmental Management and Assessment;

- mapping on 1:25,000 and 1:10,000 scale plans of all designated or sensitive areas and identification pf viewpoints that may act as issues or constraints to scheme development;
- broad classifications of the landscape into homogenous units of character and quality taking into account local landform and terrain features (i.e. areas of flood plain, major ridge lines etc), landscape character areas, areas of designated landscape importance, areas of poor landscape quality, areas of open views, extent of vegetation cover, areas of historical or cultural importance, pattern and type of settlement or infrastructure to establish the baseline landscape conditions;
- site visits to verify the baseline conditions and establish a photographic catalogue depicting key landscape features or attributes;
- the production of a statement of quality describing the baseline landscape and an assessment of the potential landscape and visual impacts likely to exert an influence on the development of the scheme within the area of interest.

8.2.5.5 Townscape

The study area does not directly affect any significant areas of residential population. Given the rural nature of the study area, the townscape sub-objective has been deemed not applicable to this assessment.

8.2.5.6 Biodiversity

The approach adopted for the consideration of biodiversity issues as part of the stage 1 scheme assessment work has followed the methodologies set out under DMRB Volume 11 (Section 3, Part 4). This has principally involved:

- a desktop literature review (to assess available citation sheets) and database searches of the study area to collate available information on the ecological and biodiversity values and to identify potential ecological issues and constraints. Records for habitats and species recorded in the study area were obtained from the *Centre for Environmental Data and Recording (CEDaR)* based in the Ulster Museum;
- a phase 1 habitat survey which was carried out during August 2006 in accordance with the approved methodology under the Joint Nature Conservation Committee (JNCC) *Handbook for Phase 1 Habitat Survey* (2003). The survey comprised the production of a habitat map using available aerial photography, a preliminary walkover survey from existing public walkways, local vantage points, and roads in order to identify the potential presence of protected flora and fauna species and their habitats;
- identification and mapping of statutorily designated sites of nature conservation interest;
- consideration of relevant legislative requirements, particularly the requirements for an Article 6 assessment as required under the EC Habitats Directive 92/43/EC for developments considered likely to give rise to significant direct or indirect environmental effects on Natura 2000 sites or areas such as the Main Valley Bogs SAC, a European designated nature conservation site; and
- consultations with key stakeholders such as the DOE - EHS Natural Heritage, Ulster Wildlife Trust, and the Royal Society for the Protection Birds (Northern Ireland).

8.2.5.7 Heritage of Historic Resources

The approach adopted for the consideration of cultural heritage issues as part of the stage 1 scheme assessment work has followed the methodologies set out under DMRB Volume 11 (Section 3, Part 2). This has principally involved:

- a desktop review of relevant published information, including reports, maps and aerial photography;

- a review of listed building and scheduled monument listings provided by DOE – EHS (Built Heritage);
- a search of the *Monuments and Building Records* maintained by DOE – EHS Built Heritage to obtain information on the location of designated sites;
- the identification and mapping of potential archaeological and historic constraints, such as scheduled monuments, listed buildings and state care monuments located within, and in the immediate surrounds of, the study area; and
- consultations with DOE – EHS (Built Heritage) - who are responsible for the identification, recording and protection of archaeological sites and monuments and other buildings of architectural and historic interest - on the nature of the local heritage resource, particularly the distribution of known and designated heritage sites of interest within and immediately surrounding the study area.

8.2.5.8 Water Environment

The approach adopted for the consideration of issues on the local water environment as part of this stage 1 scheme assessment has largely followed the methodologies set out under DMRB Volume 11 (Section 3, Part 10). This has principally involved:

- consultation with the DARD - Rivers Agency to obtain relevant background information on key surface water features, flooding history of the River Main, flow data from gauging stations located within or immediately upstream and downstream of the study area;
- a site visit to identify key water features key locations, including discharge points of watercourses;
- a review of flow data provided by the DARD - Rivers Agency for the Dromona gauging station;
- a review of previous HEC-RAS modelling previously undertaken by the Rivers Agency to determine the 1:100 year flood extent;
- mapping the location of all major and minor watercourses and other water features in the study area;
- the preparation of a FRA in accordance with the provisions of *PPS 15: Planning and Flood Risk* and *CIRIA C624 Development and Flood Risk – Guidance for the Construction Industry* to determine the lateral extent of the 1:100 year flood level for the River Main and its associated tributaries;
- identification of areas sensitive to water pollution, presence of fisheries and obstructions in the local water bodies;
- description of potential impacts on overland flow regimes, local water quality and flood risk; and
- consultation with DoE - EHS (Water Management Unit) to obtain relevant background information on water quality, monitoring stations, pollution sources and local knowledge.

8.2.5.9 Physical Fitness and Journey Ambience

For this early stage of scheme assessment, a qualitative assessment was undertaken for physical fitness and journey ambience. The approach adopted for the consideration of these issues has largely followed the methodologies set out under DMRB Volume 11 (Section 3, Part 8) and has principally included:

- consultation with the local authorities on existing community facilities, cycleways, public rights-of-way and footpaths within the study area;
- a review of relevant published information, including reports and maps;

- site visits to verify the baseline conditions and identify the location and state of existing community facilities, public open space, footpaths and cycleways, and the existing A26 corridor; and
- identification of the potential impacts likely to result from the scheme proposals on pedestrians, road users and cyclists in terms of lengthening or reducing journeys, amenity value, accessing community facilities, severance and exposure to travel risks.

8.3 Safety Objective - Assessment Methodology

The safety objective comprises two sub-objectives:

- Accidents Sub-objective; and
- Security Sub-objective.

8.3.1 Accidents

WebTAG provides a methodology for assessing accidents for road schemes, and involves assessing the degree of change (positive or negative) in the accident rate for a scheme.

However, it is considered all the corridor proposals under assessment for this study would deliver a similar level of reduction in accident rates for this section of road and therefore no quantitative assessment has been undertaken for this stage 1 assessment.

A qualitative assessment has been carried out which identifies the reasons why it was considered accident rates would be reduced for each corridor. However, it is considered that accidents would not be a deciding factor between corridors.

8.3.2 Security

The security sub-objective assesses the potential impact of a scheme with regard to how it may affect the level of security for road users. The aim of this sub-objective is to reflect both changes in security and the likely numbers of users affected.

For this particular rural highway scheme, security is not considered to be a significant issue, and it is considered that this sub-objective would not advise one corridor in favour of another. Therefore, the security sub-objective has not been assessed for this stage 1 assessment.

8.4 Economy Objective – Assessment Methodology

8.4.1 Cost-Estimate

Preliminary cost-estimates were undertaken for the corridors. The methodology adopted for the stage 1 cost-estimates is described below.

8.4.1.1 Cost-estimate Assumptions

The designs for the corridors at this stage were based on coarse topographical survey information. This allowed an approximation of earthworks quantities to be produced for costing purposes for all the corridors. However, the quantities developed at this early stage are not considered accurate and have been assessed as an indication of typical quantities. More detailed earthwork quantities will be developed during the stage 2 assessment.

Earthworks were costed on a per m^2 basis.

No quantified risk assessment was undertaken for the stage 1 assessment. It is proposed to undertake a fully-quantified risk analysis during stage 2.

The following comments or exclusions apply to the costings of all corridors:

- the estimates were based on prices from three road projects in Northern Ireland, adjusted to prices at 4th Quarter 2006;
- the costs were based on an indicative construction period of 24 months;
- the allowance for pavements reflected significant recent increases in surfacing and bitumen prices;

- street lighting was only priced at junctions and tie-ins;
- the estimate included for the preparation and supervision of the scheme;
- contractor's overheads and profit were included;
- by using a combination of target cost, actual cost and forecast out-turn cost data, the cost-estimate for each corridor represented an assessment of the eventual out-turn cost of the project;
- optimism bias was included (see section 8.4.1.2), but no risk allowance was included;
- all costs excluded VAT.

8.4.1.2 Optimism Bias

Optimism bias was applied in accordance with the Roads Service guidance note *DEM 91/05, Major Works Estimates*. This guidance requires a maximum 44% optimism bias to be applied as an upper limit estimate for this stage of scheme design. However, the guidance provides a mechanism for reducing the level of optimism bias, based upon local knowledge of the scheme and the constraints. It was considered that sufficient knowledge of the study area was obtained through the stage 1 assessment process to justify the application of a reduction to the level of optimism bias for this scheme and an optimism bias of 22% was adopted for the cost-estimation of the corridors.

8.4.2 Risk Assessment

A stage 1 risk assessment workshop was undertaken on 20th September 2006. The workshop attendees were a combination of Roads Service representatives and the key discipline leaders from the study team. At the workshop the risks associated with the corridors, outlined in chapter 7, were identified and a risk register developed.

The risks were then semi-quantified in terms of their probability and severity. The risk classification scheme is shown in

Table 8.4. Judgements were made as to the most appropriate probability band for each identified risk and the value recorded in the risk register. Risk severity was assessed in a similar manner, depending upon the potential impact upon capital cost or programme. All assessments were recorded in the risk register (Appendix E).

Quantification of capital cost risk exposure will be undertaken at stages 2 and 3.

Table 8.4: Risk Classification Scheme

Probability of occurrence (P)			Severity on the project (S)			
Scale	Typical Range	Value	Scale	Suggested Cost Range	Suggested Programme Range	Value
Remote	0%-1%	1	Insignificant	<£50k	<1 week	1
Very Low	1%-10%	2	Low	£50k-£100k	1 week – 2 weeks	2
Low	10%-30%	3	Medium	£100k-£500k	2 weeks – 1 month	3
Medium	30%-50%	4	Serious	£500k-£1million	1 month – 6 months	4
High	50%-70%	5	Very serious	£1million-£5million	6 months – 12 months	5
Very High	>70%	6	Catastrophic	>£5million	>12 months	6

8.4.3 WebTAG Assessment

The economy objective comprises four sub-objectives in WebTAG:

- Public Accounts,

- Transport Economic Efficiency,
- Reliability, and
- Wider Economic Impacts.

8.4.4 Public Accounts

The distribution of impacts between government and society is a key issue in the justification of government action. Thus, the DfT requires an aggregation of costs that highlight the impact of a proposal on public accounts.

At this early stage of assessment a crude assessment of public accounts has been made. This includes for central government funding for:

- operating costs,
- investment costs, and
- indirect tax revenues.

It should be noted that *DMRB Volume 13 (COBA manual), Section 1, chapter 4, paragraph 4.4* states that the default present value year in COBA is 2002. This is in line with the WebTAG guidance which states the base year for discounting, to which all costs and benefits should be discounted, is 2002.Therefore, the public accounts results are presented as 2002 prices in this report.

The PA section of the table details the costs to Government due to the scheme, divided between Central and Local Government. The A26 dualling scheme is funded by Central Government, and the Local Government contribution is zero.

8.4.5 Transport Economic Efficiency

For each of the corridors under consideration, a transport economic efficiency (TEE) table has been produced which summarises and presents the economic benefits due to the scheme.

In the TEE table, Consumer and Business user benefits are provided separately. Consumer benefits comprise benefits to non-work and commuting trips while business benefits are benefits to trips conducted during the course of work (e.g. deliveries). Business benefits are further divided into personal and freight, with the former involving work trips which do not involve the transport of goods.

Benefits are given for:

- Travel time (i.e. representing saving in travel time due to the scheme which is converted to monetary values based on the “values of time”);
- Vehicle Operating Costs Savings which are reductions in fuel consumption and in other non-fuel vehicle operating costs; and
- User charges, which represent tolls and charges which are not applicable to this assessment and hence valued as zero.

Trips are also divided into road and bus. The buses have not been separately assessed in this assessment and the benefits are all aggregated into the “road” mode, therefore in this assessment, the bus column of the TEE table is populated with zeos.

Private sector provider impacts are also given in the TEE table. These relate to private sector investors and operators (e.g. rail companies) which have not been considered in this assessment. These relate to schemes where private investors are contributing the cost of the scheme. In this case this amounts to zero.

Developer contributions are where private developers make a contribution to the construction costs, which is not applicable to this study.

The monetary effect of the scheme on carbon emissions are also provided in the TEE table.

Accident Benefits can also be given in this section but they have not been included in this Stage 1 assessment.

In addition, an analysis of monetised costs and benefits has been produced to demonstrate the overall economic impacts of the corridors in terms of net present value (NPV) and benefit to cost ratio (BCR). However, it should be recognised that this assessment of the economic performance of the corridors is only coarse, and intended only to provide an indication of likely economic performance. The following limitations should be recognised when viewing the results:

- accident benefits have not been included;
- central traffic growth has been assumed;
- traffic forecast years have been taken as 2012 (notional scheme opening year), 2016 and 2027 (design year). 2016 was included as an interim assessment year to assist the TUBA interpolation process for the 60 year assessment period. (If no interim year is used, TUBA will default to a linear interpolation);
- annualisation factors have been based on automatic traffic count data for the existing A26 (from June 2006 to present day);
- scheme costs include an optimism bias of 22%;
- maintenance costs have been calculated using rates from DMRB Volumes 13 and 14 for annual routine and major maintenance respectively; and
- delays to road users due to maintenance works have not been included in this assessment.

As stated in section 8.4.4, *DMRB Volume 13 (COBA manual), Section 1, chapter 4, paragraph 4.4* states that the default present value year in COBA is 2002. Therefore, the transport economic efficiencies are presented as 2002 prices in this report.

8.4.6 Reliability

The difference between the corridors, in terms of reliability, is likely to be insignificant in terms of corridor preference. Therefore, reliability has not been assessed for this stage 1 assessment.

8.4.7 Wider Economic Impacts

The wider economic impacts sub-objective is an assessment of the economic effects of the scheme outside of those assessed in the other three economy sub-objectives. The primary purpose of this sub-objective is to appraise the wider economic impacts of a scheme designed to stimulate economic activity in a regeneration area This could include impacts such as providing improved transport links to a rural area to facilitate regeneration and enhance the potential for increased investment.

These impacts are likely to be similar for all the corridors assessed and would be unlikely to provide any differentiation between any of the corridors. Wider economic impact has therefore not been assessed at this stage of the study.

8.5 Accessibility Objective - Assessment Methodology

The accessibility objective comprises three sub-objectives:

- Corridor Values,
- Severance, and
- Access to the Transport System.

8.5.1 Corridor Values

WebTAG describes the corridor values sub-objective as particularly important for scheme assessment, if the scheme proposals will substantially change the availability of transport services within the study area. The sub-objective is therefore mainly concerned with the

provision of new transport services, the removal of existing ones and the availability of these services.

Given the fact that this project is the improvement of an existing highway, the scheme can not be assessed in terms of adding a new facility or the removal of an existing one. It is merely the betterment of an existing transport service. Therefore any assessment of corridor values is unlikely to favour one corridor over another.

Therefore corridor values have not been assessed for this stage 1 assessment.

8.5.2 Severance

This sub-objective is concerned with severance (as a result of a proposed scheme) to non-motorised modes, especially pedestrians. Cyclists and equestrians should also be considered, but are less susceptible to severance because they can travel more quickly than people on foot. The severance sub-objective does not deal with individual land owner severance issues.

There are no designated public footpaths or bridleways within the study area, and there are no existing cyclist facilities. Severance is therefore unlikely to be a significant factor between the corridors and for this stage 1 assessment has not been formally assessed.

8.5.3 Access to the Transport System

For this sub-objective, WebTAG states that the most important determinant of access to the transport system is the availability of a vehicle for private use. In assessing this sub-objective, analyses should therefore be conducted to show the proportions of households without a car available within the study area. For those without a car, access to the public transport system is of crucial importance.

All the corridors under consideration for this stage 1 assessment are considered to deliver similar opportunities for this sub-objective. Therefore, access to the transport system has not been assessed at this stage.

8.6 Integration Objective - Assessment Methodology

The integration objective comprises three sub-objectives:

- Transport Interchange,
- Land Use Policy, and
- Other Government Policies.

8.6.1 Transport Interchange

The transport interchange sub-objective aimed at providing a measure to assess a scheme against the Government's objective of achieving truly integrated transport.

The corridors being considered for the A26 dualling scheme are likely to perform to an equal standard when assessed for transport interchange, and the sub-objective has therefore not been assessed at this stage.

8.6.2 Land Use Policy and Other Government Policies

The approach adopted to determine the compatibility of the A26 scheme proposals with relevant legislative and planning policy provisions has largely followed methodologies set out under DMBRB Volume 11 (Section 3, Part 12). This has principally involved:

- a review of relevant Northern Ireland legislation and planning policy statements to determine the compatibility of the scheme against such provisions;
- consideration of local land use and transport plans and guidance contained under the *Draft Northern area Plan 2010 – 2016* and the *Antrim, Ballymena and Larne Area Plan 2016*;
- a review of the key strategic transport and planning guidance in Northern Ireland such as, *Shaping Our Future: The regional Development Strategy for Northern Ireland 2025,*

A Planning Strategy for rural Northern Ireland, the Regional Strategic Transport Network Plan 2015 and the *Draft Sub-Regional Transport Plan 2015*;

- a review of the DoE – Planning Service online database (insert web details) to obtain information on all current and proposed development applications and plans in the study area which may either have an impact on or be impacted by the scheme proposals;
- analysis to determine whether the route corridors would achieve, or comply with, requisite national policy objectives and directions; and
- determination as to whether the scheme proposals would broadly achive the objectives of all relevant plans and policies.

9 Corridor 1 – Western 2

9.1 Introduction

The Western 2 Corridor is an almost wholly off-line corridor to the west of the existing A26. From the Glarryford junction, this corridor would involve a short section of on-line improvement to the existing A26 to a point in the vicinity of an existing petrol filling station to the south of the Frosses Trees. At this point the corridor would move off-line to the west. The corridor would cross the River Main and would come to within 200m (approximately) of the Belfast to Londonderry/ Portrush railway line. The corridor would then curve clockwise andrun approximately parallel with the existing A26. To the north of the B93 (Killagan Road) the corridor rejoins the existing A26 at a new junction with the A44, passing through an area containing the River Main, Killagan Water, and numerous minor watercourses.

This corridor has a major benefit as the new road would be aligned away from existing residential properties and farm buildings in most instances. However, as the corridor is almost wholly greenfield construction, the scheme would require a significant amount of land to be acquired through compulsory purchase.

The Western 1 Corridor is presented on drawing A26-HWY-006 in Appendix A.

This chapter provides a broad assessment of the predominantly off-line Western 2 Corridor (Corridor 1). A full description of this corridor is provided in Section 7.3.

9.2 Engineering Assessment

9.2.1 Geometry and Departures from Standard

For this corridor, it is envisaged that it should be possible to design a horizontal and vertical alignment that would be compliant with the DMRB for a design speed of 120kph, which would not require any departures from standard.

A significant proportion of the corridor would be required to be constructed across the River Main floodplain. It is anticipated that up to 2.5km of the corridor would be required to be constructed on embankment at a height of between 2.0 to 2.5m in height above the floodplain.

9.2.2 Junctions

Junction improvements, or new junctions would be required on the A26 for intersections with the following side roads:

- B64 (Station Road/ Springmount Road – Glarryford crossroads);
- B93 (Killagan Road); and
- A44 Drones Road.

9.2.3 Structures

Bridge numbers 10211 and 10212 which cross the River Clogh at the southern end of the scheme are considered to be outside the study area, and therefore outside the scope of this assessment and have not been considered at this stage.

It is likely that this corridor would cross the River Main in two locations. It is probable that both these crossings would require bridges rather than culverts.

In addition to the River Main, the northern end of the corridor contains a complex network of tributaries and streams distributed across the floodplain. This would result in a large number of culverts being required to avoid disruption to these minor tributaries.

For the purposes of cost-estimation, the assumed junction strategy includes for some grade separation through compact grade separated junctions (see Section 5.4). For this corridor that would result in two new road bridges taking the side road over the new A26.

The route of this corridor would pass through some agricultural land and there is a possibility that the corridor could affect or change some existing land access arrangements. In certain

cases it may be appropriate to investigate the provision of alternative access arrangements which might include additional lengths of access track, relocated accesses, or even accommodation underpasses in exceptional circumstances.

9.2.4 Water Quality and Highway Drainage

For the majority of its length, the Western 2 Corridor passes through or adjacent to, the existing 1:100 year flood plain of the River Main (see drawing number A26-ENV-003, Appendix D). In these locations the scheme would require construction on a 2.0m to 2.5m embankment to ensure that the road formation remained above the associated 1 in 100 year flood level. Compensatory flood areas would have to be provided to replace any areas of the flood plain lost by the footprint of the scheme.

The corridor crosses the River Main in two locations as well as the Drumadoon watercourse and it is assumed that all three crossings would require bridge structures, as is the case with the existing A26 route. In addition the route crosses six designated and one undesignated minor watercourses as well as a significant number of bog reens. It is possible that the majority of the minor watercourses will require culverts with fish beds and otter ledges and it should be assumed that all bog reens will at least have to be culverted.

It is anticipated that the highway surface water run-off will generally be discharged into the adjacent River Main and associated watercourses. These outfalls would require pollution control provision as well as, almost certainly, attenuation facilities. Keeping the petrol interceptors above the flood level could be difficult and with any attenuation pond requiring excavations to be at least 1.0m below the outfall level, this could lead to ground water problems in certain locations.

The corridor also passes between the two ASSI's of the Frosses Bog and the Dunloy Bog. These ASSI sites form part of the Main Valley Bogs SAC, and are understood to be hydologically connected. It would be imperative that the highway surface water run-off be controlled to prevent contamination of the many watercourses which feed into these Bogs. The treatment requirements for any highway surface water outfall into these watercourses or directly into the bog, are likely to be more onerous and expensive than the standard petrol interceptor provision.

Emergency spillage ponds may also be required at the three proposed junctions for this corridor depending on traffic flows. These normally have a capacity of 50 cubic metres and are sited at the associated outfall. The construction of the spillage ponds at all three junction outfalls could encounter ground water problems particularly at the proposed B93 (Killagan Road) junction.

The surface water drainage strategy for the scheme would need to be agreed with the Rivers Agency and the Environment and Heritage Service and this would be undertaken during the stage 2 assessment, should this corridor be progressed.

9.2.5 Public and Private Utility Services

The majority of the existing public and private services known to be present within the study area appear to be limited to the existing A26 route corridor and the adjacent B93 (Killagan Road) and Old Frosses Road corridors.

The Western 2 Corridor is predominantly off-line from the existing A26 corridor, and as a result, the only existing services potentially affected are at the southern and northern tie-ins on the existing A26 and at the intersection with the B93 (Killagan Road). These can be listed as follows:

- at the southern end for approximately 1km, the corridor proposes on-line widening of the existing A26 which carries longitudinal BT underground fibre-optic cables along this whole length;
- at this southern end, the corridor also intersects a Water Service water main, a 33kV overhead Northern Ireland Electricity (NIE) cable and an 11kV overhead NIE cable;

- at the northern end, where the corridor crosses the B93 (Killagan Road), it intersects a Water Service water main, a 33kV overhead NIE cable and two 11kV overhead NIE cables; and
- at the northern end tie-in, the proposed junction with the A44 (Drones Road) utilises a section of the existing A26 corridor which carries BT underground fibre-optic cables and a Water Service water main.

The level of impact on these existing utility services and the associated diversion requirements will be assessed and confirmed during the stage 2 assessment. An allowance has been included within the cost estimate for this corridor for utility service diversion.

9.2.6 Geotechnical Issues

Corridor 1 would traverse the River Main valley bottom, which is largely a broad, flat alluvial flood plain characterised by deposits of peat. Construction across this flood plain would be likely to require much of this corridor to be on embankment.

The initial section of the corridor north of Glarryford would traverse the valley bottom obliquely and would pass to the west of the Frosses Bog ASSI, reaching the western part of the valley bottom at Lowtown. A considerable proportion of this section, of approximately 3.0km in length, would be required to be on embankment because of the flood plain. This particular section would also suffer from poor ground conditions, comprising mostly alluvial and peaty soils of variable thickness. Construction through this poor ground would be likely to require significant removal and disposal of soft, unsuitable material, or significant ground improvement or stabilisation. The cost estimates for this corridor have assumed piling through this poor ground.

North of Lowtown, the corridor would traverse the western edge of the valley bottom. The ground conditions comprise hummocky glacio-fluvial deposits which mainly comprise sands and gravels. Some hollows in the surface of the sands and gravels may by infilled with alluvial and peaty deposits and groundwater is likely to be high. Similarly, to the southern section of this corridor, significant areas of poor ground would be expected to be encountered, although to a lesser extent than previously described. Again, an element of ground improvement or stabilisation has been allowed for in the cost estimate, based upon limited piling through this poor ground.

The northern section of the corridor crosses the valley bottom once more. This section, about 1.0km in length, would again be required to be on embankment, crossing poor ground conditions comprising alluvial and peaty soils of variable thickness. Construction through this poor ground would be likely to require significant removal and disposal of soft, unsuitable material, or significant ground improvement or stabilisation. The cost estimates for this corridor are based upon piling through this poor ground.

The final section of this corridor would closely follow the edge of the valley bottom, to the west of the better drained ground followed by the present A26. Much of this section, about 1.0km in length, would probably be on low embankment, formed on alluvial and peaty soils, although this material may be thin in places, possibly requiring a limited amount of removal of unsuitable material.

9.2.7 Impact Upon Buildings and Property

Corridor 1 (together with Corridor 5) would be expected to have the least impact upon residential properties or other buildings within the study area out of all the corridors under consideration. It is considered, subject to more detailed assessment at Stage 2, that potentially a dual carriageway could be provided within Corridor 1 which resulted in no direct impact to any buildings. However, subject to confirmation of land ownership boundaries, some impact to land associated with buildings may result.

9.2.8 Construction Issues

A significant length of this corridor would be required to be constructed on an embankment, estimated at between 2.0m to 2.5m above the level of the existing floodplain. This would require a significant amount of imported fill material with which to form the embankments. An additional

problem might be with the potential extension to the construction programme to facilitate the consolidation of these embankments.

In addition, it is likely that this corridor would pass over significant lengths of peat-covered ground of varying thickness, which could require either significant ground improvement works or removal of the unsuitable material from site. This would also be likely to result in the need for a significant amount of imported fill material. This has been allowed for in the cost estimates for this corridor.

Possible sourcing of fill material has not been considered at this stage of assessment. However, given the existence of several local quarries, there is not considered to be a sourcing problem, merely an addition to the cost of the corridor.

Several new structures would be required for this corridor, including two crossings over the River Main, and numerous culverts. No significant construction issues are envisaged for these structures, with the exception of potentially poor ground necessitating the need for piling of abutment foundations.

Traffic management is not considered an issue for this corridor as the majority of the route is off-line in relation to the existing A26. The only section more central to the existing route would be for the first 1km at the southern end of the scheme and at the northern tie-in.

9.3 Traffic Assessment

9.3.1 Introduction

The transport impact of this corridor has been assessed on a preliminary basis. At this coarse stage of assessment, there is little difference between any of the corridors assessed with respect to traffic movements

9.3.2 Traffic Flow Changes

An estimate of road network flows for this corridor has been made. Detailed alignment and junction layouts have not yet been determined, the forecast flows, at this stage, for an improved A26 are therefore broad estimations, and assume that virtually all existing A26 traffic would transfer onto the new A26 dual carriageway for at least part of their journey.

For this stage 1 assessment it has been assumed that flow patterns on side roads would remain as with the present case.

Table 9.1 shows the broadly estimated flows on each road link for 2012, the notional year of opening, and for 2027, the design year, with the new A26 improvement in place. It has been assumed that a nominal number of vehicles per day transfer from the new A26 dual carriageway onto the old A26, based upon the limited number of properties along the remaining Old A26 route.

The results of this early traffic assessment are presented graphically in figure 9.1 (overleaf).

It should be noted that the flows given in table 9.1 are preliminary estimates. Origin-destination data was unavailable at the time of this study, and thus detailed estimating of re-routing of traffic was not possible. It is expected that this work should be undertaken at stage 2 should this corridor be progressed.

Figure 9.1: Traffic Flows for the Western 2 Corridor

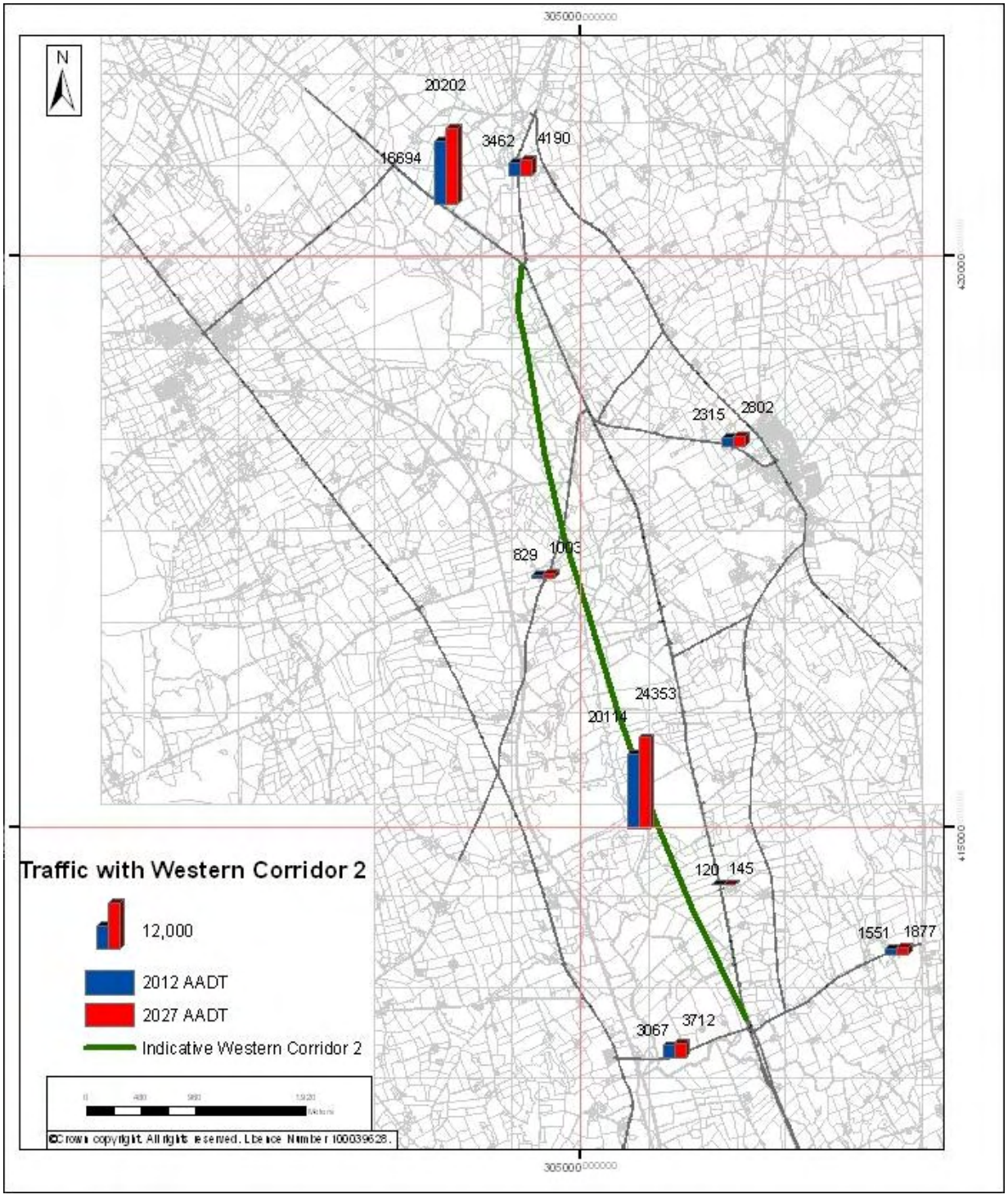


Table 9.1: Estimated Forecast Flows with A26 Improvement in place

Road	Direction of Flow	2012 Year of Opening AADT	2027 AADT
New A26 Improvement, north of B64	**northbound**	**10,021**	**12,133**
	southbound	**10,093**	**12,220**
(Old A26) Frosses Road	northbound	60	72
	southbound	60	73
B64 (Station Road), west of A26	*eastbound*	1,524	1,844
	westbound	1,543	1,868
B64 (Springmount Road) east of A26	*eastbound*	778	942
	westbound	773	935
Lisnasoo Road	*eastbound*	1,076	1,303
	westbound	1,033	1,250
B93 (Killagan Road), west of A26	*northbound*	397	480
	southbound	432	523
B94 (Drumadoon Road), east of A26	*eastbound*	1,184	1,433
	westbound	1,131	1,369
A44 (Drones Road), north of A26	*northbound*	1,679	2,032
	southbound	1,783	2,158

9.4 Environment Objective

9.4.1 Introduction

The potential environmental impacts associated with the construction and operation of the Western 2 Corridor are described in this section.

9.4.2 Noise

Seven farmhouses are scattered across the River Main floodplain to the west of the existing A26 which is characterised by large expanses of low-lying, open and gently undulating farmland and boggy ground. On elevated ground flanking the western edge of the floodplain beyond the Belfast to Londonderry / Portrush Railway Line, a number of residential dwellings straddle both sides of the B93 (Killagan Road) between its junction with the B64 (Station Road) at Glarryford and its junction with the A26. In total, there are approximately 41 residential dwellings located within 300m of the Western 2 Corridor, as follows:

- Within 50m – 2 residential dwellings;
- 51m to 100m – 8 residential dwellings;
- 101m to 150m – 4 residential dwellings;
- 151m to 200m – 13 residential dwellings;
- 201m to 250m – 7 residential dwellings; and
- 251m to 300m – 7 residential dwellings.

Other non-residential receptors that may be potentially affected by the construction and operation of the Western 2 Corridor include a church and post office at Glarryford.

Ambient noise levels across the River Main floodplain are relatively low, typifying its rural setting whereby there is little or no traffic. The introduction of a new dual carriageway road to the west of the existing A26 would lead to a discernible increase in ambient noise levels from road traffic activities (i.e. greater than 3dBA change in background noise levels), particularly on the facades of residential dwellings clustered around Glarryford and straddling both sides of the B93 (Killigan Road), and scattered farmhouses across the floodplain. This would result in a significant change in ambient noise levels currently experienced once the new road is

It is likely that the development of the Western 2 Corridor would result in noise improvements along the existing A26 through the transference of through-traffic flows to the new roadway and a reduction of greater than 20% in traffic volumes on the existing A26. However, further investigation into this particular issue will be examined during the next stage of scheme development.

The potential does exist for some residential dwellings to qualify for noise insulation where ambient levels exceed 68dBL_{A10}, 18 hour under the *Noise Insulation Regulations 1975 (as amended 1988)*. A package of appropriate noise mitigation measures would be required to assist a western corridor in conforming with requisite noise guidelines and operating criteria.

Drawing Number A26-ENV-003 (Appendix D) shows the distribution of noise sensitive receivers within 300m of Western 2.

9.4.3 Local Air Quality

There are approximately 27 residential dwellings located within 200m of the Western 2 Corridor which would be exposed to temporary episodes of construction dust and motor vehicle emissions (i.e. from both stationary and flowing traffic) during operation as follows:

- Within 50m – 2 residential dwellings;
- 51m to 100m – 8 residential dwellings;
- 101m to 150m – 4 residential dwellings; and
- 151m to 200m – 13 residential dwellings.

The introduction of this new road corridor would result in an increase of motor vehicle emissions of PM_{10}, NO_2, CO and hydrocarbons such as benzene and 1, 3 butadiene. These emissions would gradually reduce local air quality over time for those residential properties, agricultural land and sensitive ecology areas which currently exist both along and in the vicinity of this corridor. However, this may be offset by improved traveling conditions, reduced periods of traffic congestion and the transference of through traffic flows from the existing A26 to the new corridor could also lead to a reduction in the volume of motor vehicle emissions. Furthermore, other sensitive receptors such as ecological communities and habitats of interest to protected fauna species could also be adversely affected by fugitive dust outbreaks and entrainment during construction and increased traffic emissions during operation.

Appropriate mitigation measures will be identified in order to minimise the impact of the scheme on local air quality during scheme construction. A package of dust suppression and traffic management measures will be developed in consultation with the Local Authority EHOs and DoE – EHS and in accordance with the Code of Construction (CoCP). Operational mitigation measures for this scheme proposal would be developed in more detail during the Stage 2 and 3 scheme assessment process.

Drawing Number A26-ENV-006 (Appendix D) shows the distribution of sensitive air quality receptors within 200m of the Western 2 Corridor.

9.4.4 Greenhouse Gases

It is likely that the impact on greenhouse gases will be similar for each of the corridors under consideration. Emissions of greenhouse gases could potentially increase as road traffic increases, thus possibly contributing to climate change via the global warming effect. However, it is also possible that there could be an offset associated with this due to vehicles travelling at optimum speeds and the adoption of cleaner fuel technologies and more efficient motor vehicle designs. Emissions of greenhouse gases from the road transport sector are expected to rise in the UK as a whole, as growth in road traffic outweighs benefits from adoption of cleaner technology. Further investigation of the realistic impacts of the proposed Western 2 Corridor on greenhouse gases will be undertaken at stage 2 and 3 of the scheme design.

9.4.5 Landscape

The Western 2 Corridor would traverse the low-lying, valley floor of the River Main floodplain for its entire length. The landscape fabric along this corridor is characterised by gently undulating

terrain, large open fields of improved grassland enclosed by mix of post and wire fences and hedgerows of variable structure and species diversity, extensive areas of raised bog and floodplain and fen mire habitats, private woodlands, small copses and individual mature trees. The introduction of a new road corridor built largely on embankment above the floodplain to achieve the 1:100 year flood immunity level would be a prominent built element in the local landscape.

The principal landscape impacts associated with the development of the Western 2 Corridor would include:

- property - loss and severance of existing agricultural land holdings and property boundaries (i.e. fence-lines and hedgerows);
- vegetation cover – alteration to the existing vegetation mosaic and direct loss of sensitive habitats across the floodplain. It would also potentially cut through woodland areas at Ballyhurtherland and Lowtown, reducing the limited extent of vegetation cover that currently exists on the River Main floodplain.
- landform – deposition of significant volumes of spoil material to raise ground levels between 2m and 2.5m above the floodplain to create suitable road embankments and a level base for the new road platforms. This activity would alter the natural profile of the floodplain, creating an artificial built element and modifying transverse drainage flows;
- land use – material change to the existing land use pattern across the floodplain with the introduction of new transport infrastructure (i.e. new road corridor). There would also be a small direct loss of good quality agricultural land which is largely improved grassland used for rough cattle grazing; and
- river corridor - the introduction of new bridge structures to cross the River Main and its tributaries, and installation of drainage culverts to maintain transverse drainage flows will result in significant localized effects within the river corridor and its immediate vicinity.

This corridor will not directly or indirectly affect any landscape designations within the study area.

The openness and low-lying nature of the floodplain provides limited opportunity for natural screening and concealment by existing landform features and vegetation. Sympathetic aesthetic design and landscape treatments, including bridge finishes and landscape mitigation planting would be required to effectively integrate a new road into the landscape and soften any potential visual intrusion.

From a visual perspective, long views from elevated ground flanking both the eastern and western edges of the floodplain would only be partially interrupted by the intervening drumlin topography and small blocks of vegetation. The new road corridor would be highly visible in the landscape, difficult to conceal and interrupt the openness of floodplain. Opportunities to intermittently screen sections of the new road and filter some of these elevated views would be available through the planting of low-level shrubs and trees, grass seeding and structured trees on road embankment batters and around new bridge crossings. Furthermore, the new road corridor would also be prominent in the immediate views of farmhouses and residential properties scattered across the floodplain and situated along the B893 (Killigan Road) and the existing A26. Sections of the new road would be partially obscured by intervening drumlins, trees and hedgerows, and existing buildings. Motorists travelling along the existing A26 and local roads would be afforded glimpsed views of the new road.

During the scheme's operation there is the potential for impacts associated with light-spillage and sky-glow from motor vehicles travelling along the new dual carriageway and at key junctions located at the southern and northern tie-in points.

A landscape strategy incorporating a package of mitigation measures and design treatments would be developed to integrate this corridor into the existing landscape fabric as effectively as possible. The strategy would consider proposals for earth shaping and re-contouring, vegetation screens and barriers, drainage design, reinstatement of severed hedgerows and vegetation blocks and planting measures for the road's embankments across the River Main floodplain. A key focus of the landscape mitigation would be the approaches to and crossing of watercourses. Such measures would be developed as part of the Stage 2 Scheme Assessment work, however, given the open, flat aspect of the River Main valley, extensive landscape mitigation would be required and it is doubtful to what success might be achieved.

9.4.6 Biodiversity

9.4.6.1 Statutory and Non-Statutory Designated Nature Conservation Sites

The principal biodiversity constraint to the development of the Western 2 Corridor is the Frosses Bog ASSI which also forms part of the Main Valley Bogs SAC, a European designated site under the *EC Habitats Directive 79/43/EC*. This corridor avoids any direct incursion into the Frosses Bog ASSI, however, it does pass within approximately 50m of the south-western part of the bog just prior to the first crossing of the River Main.

If selected as the preferred corridor, Western 2 could lead to irreversible damage and adverse impacts on the "feature interests" of the SAC, and, in addition, to any environmental statement prepared during the stage 3 assessment, an Article 6 Assessment ('appropriate assessment' is required under Article 6(3) & (4) of the *Conservation of Natural Habitats and Wild Flora and Fauna Directive (92/43/EEC)*, known as the Habitats Directive. The Habitats Directive has been transposed into national legislation through the *Conservation (Natural Habitats) Regulations Northern Ireland 1995*) would be undertaken to assess whether road construction and operation would impact on the integrity of the habitats of the bog system.

There are three non-statutory designated nature conservation sites either located along or within the vicinity of this corridor (from south to north), including:

- Killycreen North SLNCI;
- Frosses North SLNCI; and
- Boyd's Bog SLNCI.

This corridor would not involve any direct incursions into the Frosses North SLNCI or Boyd's Bog SLNCI and at its closest point passes within approximately 340m and 150m of each designated SLNCI.

9.4.6.2 Principal Impacts

Construction of the Western 2 Corridor would involve extensive earthworks and the importation of large volumes of suitable fill materials to establish the desired road embankment levels, the construction of new bridges and drainage culverts, and installation of new road drainage systems and landscaping. Such road construction activities would result in the direct loss of areas of raised bog, floodplain and fen mire habitats and the potential loss of a narrow section (i.e. 0.23 ha) of the Killycreen North SLNCI to the west of the River Main. These areas support habitats of interest to a variety of fauna species (i.e. small mammals, invertebrates, reptiles, amphibians, birds) which use the floodplain to nest, feed, and seek refuge. Some of these species are also likely to be listed as protected species under the *EC Habitats Directive 79/43/EC* and the *Wildlife (Northern Ireland) Order 1985*. Development of this corridor would also require a number of watercourse crossings which could adversely affect local water quality and aquatic biota.

Overall, the principal impacts on local ecology would include:

- Habitat fragmentation – the direct loss and fragmentation of contiguous zones of raised bog habitats across the River Main floodplain into two or more smaller areas and severance of hedgerows, leading to habitat delineation, genetic isolation, physical

barrier and edge effects, and an overall reduction in habitat values and species diversity;

- Edge effects – the creation of transitional zones extending from the new road corridor into areas previously undisturbed by road development. These areas are characterized by changeable levels of noise, light, wind speed, and temperature which can result in changes to the microclimate, floristic composition and assemblages, hydrology, introduction and presence of invasive species, pollution and rubbish accumulation, tree death (where applicable), and improved predator access;
- Physical barrier formation – the creation of a physical barrier across the River Main floodplain that would potentially obstructs wildlife movements across the new road corridor, particularly in relation to badgers and otters;
- Loss of wildlife corridors – the removal and clearing of vegetation communities and habitats across the River Main floodplain would reduce habitat connectivity of the local and migratory wildlife populations, decrease potential foraging cover to encourage movements between habitat areas, reduce genetic diversity, access and potential for re-colonisation;
- Wildlife mortality – the introduction of a new road corridor would increase the potential for wildlife to enter onto highway land and collide with motor vehicles resulting in injury or death of mobile species of wildlife such as small mammals, i.e. badgers; and
- Altered hydrological regimes – the development of new road infrastructure across the River Main floodplain may result in the modification of the natural drainage regime and patterns, and increase the volume and velocity of surface water runoff from the hard, imperious pavements of the road surface. This runoff would require a level of treatment and containment prior to its eventual discharge into the local water environment.

The alteration of surface hydrology due to road development works on the River Main floodplain could directly affect the hydrological connectivity and natural drainage functions which are integral to the ecological integrity of the Main Valley Bogs SAC. This is particularly the case with the link between Caldanagh and Dunloy Bogs ASSIs to the north-west of the study area, and the Frosses Bog ASSI in the southern part of the study area. Critical impacts on these bog systems could include an altered hydrological regime that leads to the drying-out of the bogs, nutrient enrichment of the lagg and associated buffering habitat, sedimentation through altered overland flow patterns and influx of road runoff, and the extension of edge effects from the new dual carriageway.

9.4.6.3 Protected Plant Species

Rare plant species are likely to be confined to the main bog complex and the fen edge habitats particularly where there are base-rich communities growing in the lagg. Lower plant species such as mosses are likely to be diverse within the area, with two Red Data Book species of Sphagnums identified from the SAC. The new road corridor could also affect individual plant species through changes in growing conditions, e.g. drying out of the bog, bursting of the bog, increased dust entrainment and nutrient enrichment of the soils, sedimentation due to the effects of road runoff.

9.4.6.4 Protected Fauna Species

There is the potential that the construction and operation of the Western 2 Corridor will adversely impact upon certain protected species and their habitats across the River Main floodplain.

The direct loss of sensitive raised bog, floodplain and fen mire habitats, and areas of improved / wet grassland could adversely impact upon a number of species fully protected under the *EC Habitats Directive 79/43/EC* and Schedule 5 of the *Wildlife (Northern Ireland) Order 1985.* Specifically, the following impacts could result on protected fauna species:

- Direct impacts on a main or outlying badger setts, foraging areas, movement pathways and latrines to the south of Frosses Bog ASSI;
- Direct impacts on otters using the river Main and Cloghmills Water. Otters are known to occupy this section of the River Main catchment with the wintering surveys detecting otter activity (i.e. filed signs such as spraints and footprints were recorded) around the confluence of the River Main and Cloghmills Water;
- Direct impacts on invertebrates such as the marsh fritillary and other rare invertebrates within the various bog pools and mire / fen complexes across the floodplain;
- Direct loss of wintering / breeding bird habitats through the removal of trees, hedgerows and grassland; and
- Removal and loss of thin belts of riparian habitats straddling local watercourses flowing through this part of the River Main floodplain, including the River Main itself.

Furthermore, it is possible that some of the mature trees and farm buildings across the River Main floodplain could support bat roosts, which are legally protected, even when they are not in full use, and raptors such as the barn owl. The mosaic of floodplain habitats are also of interest to a number of protected wintering bird species listed under Schedule 1 of the *Wildlife (Northern Ireland) Order 1985,* namely the whooper swan, fieldfare, redwing and the kingfisher. The trees, scrub and hedgerows are also likely to be of interest to a number of breeding birds with certain trees being subject to tree preservation orders.

This corridor will impact upon a greater and more diverse range of habitats and consequently affect a greater range of protected species, both flora and fauna. A range of key mammal species such as otter and badger are known to exist in the corridor within their associated habitats. There may be direct impacts on otter at river crossings and works at off-line streams and ditches. The scheme may also impact indirectly on otters in terms of prey abundance and noise disturbance.

The River Main is a designated salmonid river, supporting species such as trout and salmon. The aquatic fauna is also likely to include white-clawed crayfish and lamprey eels, all of which receive legal protection. The western corridor has an increased likelihood of directly affecting spawning grounds and affecting water quality through the upper River Main catchment area.

A series of ecological mitigation measures would be developed to following the completion of targeted species surveys and as part of the Stage 2 Scheme Assessment work. These measures may include but not be limited to the installation of fauna-proof fencing to prevent wildlife from directly entering the roadway, fauna underpasses to maintain wildlife connectivity and movements across the roadway, re-routing the road to minimise or avoid the direct loss and/or severance of sensitive habitats, pre-construction closure and relocation of fauna populations (i.e. known badger setts), provision of compensatory habitats and offsets.

9.4.7 Heritage of Historic Resources

There are no listed buildings or scheduled monuments located in the vicinity of the Western 2 Corridor. The nearest listed building is Drumadoon House located at the B94 (Drumadoon Road) junction with the existing A26, and in the village of Dunloy, approximately 400m and 2km to the east and west of the new road corridor respectively. A considerable number of archaeological features such as raths, souuterrains, enclosures, and Dundermot Motte, have been identified on the River Main floodplain, however, the opportunity exists to refine the alignment within this corridor so as to avoid direct contact with known features of archaeological and cultural heritage interest.

It is likely that the disturbance to archaeological sites or remains that may have existed across the River Main floodplain would have variously occurred as a result of original land clearing, forestry, agriculture and settlement activities. Certain types of fragile archaeological remains may have been destroyed, partially destroyed, or scattered. In areas of boggy or waterlogged ground with peat layers greater than 1m in thickness, undisturbed paleoenvironmental deposits

or organic archaeological remains may exist below the plough zone which extends to approximately 0.5m to 1m below the ground surface and could be susceptible to road construction works. Road construction activities do still however have the potential to directly impact on the local, unknown archaeological resource through physical damage and disturbance, i.e. ground excavations, inadvertent vehicle intrusion.

The development of the Western 2 Corridor would require:

- comprehensive surface archaeological survey;
- potential subsurface testing and surveys programmes in areas identified as likely to be of high archaeological potential;
- erection of protective fencing and other appropriate measures around areas of 'archaeological sensitivity';
- implementation of an archaeological watching brief by a suitably qualified archaeologist to ensure that any unknown archaeological remains or deposits identified during road construction can be recorded; and
- possible salvage excavations, or other appropriate rescue-record measures, for the in-situ conservation of archaeological remains.

Such mitigation measures would be necessary in those areas involving significant excavation and ground penetration works, e.g. in proximity to watercourse crossings which will require the construction of bridge structures, and the installation of water quality control and road drainage systems.

9.4.8 Water Environment

This corridor would cross approximately 2.5 km of land situated within the 1:100 year flood extent of the River Main. It is estimated that approximately 12.3 ha of land within the 1:100 year flood extent would be directly lost to the development of the Western 2 Corridor which would significantly reduce the extent of flood storage capacity available within this section of the River Main catchment. The lateral extent of the 1:100 year flood event within the study area is shown on Drawing Number A26-ENV-002 (refer to Appendix D).

There are likely to be up to seven watercourse crossings required for the development of this corridor, as follows:

- one crossing of the River Clogh at the initial diversion point in the southern part of the study area;
- two crossings of the River Main;
- two minor watercourse crossings between the second River Main crossing and the crossing of Killagan Water;
- one crossing of the Killagan Water on approach to the northern 'tie-in' point; and
- numerous crossings of unnamed natural drainage lines flowing east to west across the River Main floodplain.

The principal environmental hazards associated with the development of the Western 2 Corridor on the local water environment are:

- increased velocity and volume of road runoff associated with the introduction of additional hard, impervious road pavement surfaces across the floodplain leading to river channel and bank erosion, and scouring;
- alteration of natural drainage patterns and overland flow regimes due to the introduction of new road infrastructure;
- increased flood risk due to the direct displacement of flood storage capacity from the introduction of new, permanent physical obstructions in watercourses (i.e. transverse drainage culverts and bridge structures) and floodplains (i.e. road

embankments) artificially concentrating stormwater flows and impeding the movement of floodwaters throughout this part of the catchment;

- increased levels of afflux both upstream and downstream within the River Main and its associated tributaries associated with road development works within the floodplain and the introduction of new bridge structures in proximity to local watercourses;
- pollution of watercourses from road runoff (i.e. influx of concrete washings, sediment laden and nutrient enriched runoff from disturbed and exposed areas during construction and or dissolved / particulate pollutants such as heavy metals and toxic compounds, floating solids (litter, road surface wear and grit), fuel oils and chemicals, and other materials in suspension during operation. Surface waters at the greatest risk will be those situated closest to the potential pollution source, especially where construction activities are proposed to take place adjacent to channels which feed the River Main. This will be a particularly risk at the sites of new watercourse crossings;
- accidental spillages of chemicals, fuel oils and other toxic products during road construction works and motor vehicle accidents during operation;
- increased risk of erosion / scouring and flooding in the catchment due to the alteration of natural drainage patterns (i.e. artificial concentration and obstruction of overland flows); and
- degradation of local water quality due to road construction works undertaken within the flush zones feeding local watercourses, particularly in the vicinity of new bridge crossings and at the installation points of drainage culverts which could lead to a detrimental impact on aquatic ecosystems of the River Main.

A number of soil and water management measures and water quality control systems would be required to mitigate any potential water quality impacts during both construction and operation. This may include, but would not be limited to, the use of sustainable drainage systems (i.e. swales, filter drains, balancing ponds and ditches), petrol interceptors, water quality control ponds, soakaways and careful drainage design. The drainage designs for this corridor would be developed in more detail as part of the Stage 2 Scheme Assessment work.

9.4.9 Physical Fitness

The corridor could be developed to incorporate pedestrian footways and cycle-ways, however, no details of such specific works are known at this stage and will be subject to development during the next phase of the design process.

Opportunities to introduce dedicated footways and cycle-ways along sections of the existing A26, and other parts of the local road network, could be afforded to improve access and connectivity for the local community. The development of an offline western corridor would also reduce the volume of traffic traveling along the existing A26 and possibility of traffic congestion during peak times and holiday periods, improving conditions and general road safety for both pedestrians and cyclists.

It is unlikely that the development of the Western 2 Corridor would make allowances for pedestrians and cyclists due to the high speed nature of the new road and additional physical footprint required to accommodate such facilities across the floodplain resulting in the loss of further areas of sensitive bogland and fen or mire habitats. Subsequently, this may result in some community severance issues, however, opportunities to offset these effects could, in part, be provided by improved connectivity across the local road network between settlements.

9.4.10 Journey Ambience

This corridor would provide a new traffic route enabling motorists to travel under more free-flowing conditions and a speed consistent with the design standard of the new dual carriageway. This would lead to reduced levels of driver stress and anxiety for motorists traveling both on the new roadway and local road network, particularly the existing A26.

The Western 2 corridor would pass an open, attractive expanse of floodplain which affords panoramic and unfiltered views to the surrounding landscape and provides a greater sense of place and more pleasurable experience to the driver. It would also feature new and improved road pavement surfaces and be expected to have a low accident rate.

Overall, there would be a net improvement in road safety, a reduction in travel times along both the new roadway and existing A26 and alleviation of traffic congestion, particularly during peak times and holiday periods. All these factors would contribute to an enhanced driving experience along this section of the A26.

9.5 Safety Objective

9.5.1 Accidents

It is likely that improving the existing A26 carriageway from S2 to a D2AP carriageway would improve the safety performance of the A26. The congested nature of the existing route, with the lack of safe overtaking opportunities, currently results in a high proportion of shunt-type accidents. Improving the design standard of the route and the capacity is likely to lead to the A26 becoming a much safer, high-speed transport corridor.

Specifically, this largely off-line corridor would take the heavy volume of through-traffic away from the existing corridor, which serves a number of residential properties and farm accesses. Therefore, this corridor would be likely to reduce the potential for accidents associated with the following:

- Pedestrians. There would be little requirement for pedestrians to use the Corridor 1 transport corridor as it would not pass through any residential areas. Pedestrian would be far more likely to utilise the existing A26 corridor, which would have a greatly reduced throughput of traffic and would become a more pleasant pedestrian environment; and
- Vehicles using private direct accesses off the main road. The standard of the improved A26 highway would not permit direct private access onto the main carriageway. Access would be routed via the proposed key junctions. This will create a safer environment for vehicles entering and leaving the route.

Given the early stage of design for this study, it has not been possible to undertake a quantitative analysis to assess accident rates for the proposed route. However, the above qualitative assessment suggests accident rates for the road should reduce significantly as a result of this corridor being implemented.

9.5.2 Security

Given the rural nature of the A26 study area, security is unlikely to be a factor in deciding upon corridor preference. Therefore no assessment of security has been undertaken at this stage of assessment.

9.6 Economy Objective

9.6.1 Cost Estimate

The cost estimate for the Western 2 Corridor has been based on the following information:

- 6.2km of off-line dual carriageway;
- 1.0km of dual carriageway based along the existing route;
- 1.0km of access roads to dwellings;
- 0.2km of feeder roads;
- two highway overbridges (associated with new grade-separated junctions);
- four river crossings; and
- piled foundations through 2.5km of peat bog. An alternative estimate based on excavation of the peat material in lieu of piling was assessed to be a higher cost,

therefore a piling solution has been included in this stage 1 cost estimate. However, this will be reviewed during the stage 2 assessment should this corridor be progressed.

The following earthworks quantities were used in the development of the cost estimate for this corridor:

- earthworks cut volume 75,310m^3;
- earthworks fill volume 500,243m^3; and
- topsoil volume 65,242m^3.

Given the early stage in the design process for this assessment, it was necessary to make a number of assumptions to develop a stage 1 cost estimate. These assumptions are listed below:

- agricultural land quality is relatively poor to the west of the existing A26 and land cost has therefore been assumed as £5,000 per acre (as advised by VLA);
- given the relatively poor land quality to the west of the A26, farm or property severance is likely to be limited. Compensation costs have been assumed at 7.5% of the scheme cost;
- all roads would require temporary fencing;
- all roads require boundary fencing;
- safety fencing has been included for the full length of the central reserve;
- an allowance for safety fencing at junctions has also been included;
- 50% of all cut material was assumed to be reused on-site, the remainder was estimated to be disposed off-site; and
- 475mm thick road construction has been assumed.

The total estimated cost of this corridor, including a 22% optimism bias (see Section 8.4.2) is **£54,259,000**. A summary of the cost estimate is provided in Table 9.2.

Table 9.2: Cost-estimate for the Western 2 Corridor

Cost Item	Cost (£) - 2006 Q4	% of cost

Preliminaries	£	4,566,004.50	9.69%
Site Clearance	£	101,323.62	0.22%
Fencing & env. barriers	£	402,342.07	0.85%
Safety fences	£	713,266.32	1.51%
Drainage	£	2,326,506.88	4.94%
Earthworks	£	14,207,760.28	30.15%
Pavements	£	6,517,500.48	13.83%
Kerbs & footpaths	£	471,826.46	1.00%
Traffic signs & markings	£	434,152.86	0.92%
Street lighting	£	384,238.55	0.82%
Electrical works	£	15,616.78	0.03%
Landscaping	£	591,810.52	1.26%
Overbridges	£	1,000,000.00	2.12%
River crossings	£	800,000.00	1.70%
Accommodation works	£	966,157.55	2.05%
Statutory bodies	£	1,149,977.11	2.44%
Sub total	**£**	**34,648,483.98**	73.53%
Contractor's O&P @ 10%	£	3,464,848.40	7.35%
Sub total	**£**	**38,113,332.38**	80.88%
Land costs	£	364,022.68	0.77%
Compensation costs	£	2,858,499.93	6.07%
Sub total	**£**	**41,335,854.99**	87.72%
Preparation (9%)	£	3,720,226.95	7.89%
Supervision (5%)	£	2,066,792.75	4.39%
Sub total	**£**	**47,122,874.69**	100.00%
Optimism Bias (22%)	£	10,367,032.43	22.00%
TOTAL ESTIMATED COST (2006 Q4)	**£**	**57,489,907.12**	
TOTAL ESTIMATED COST (2005 Q1 @ - 5.62%)	**£**	**54,258,974.34**	

9.6.2 Risk

A risk assessment was carried out for this corridor. The methodology adopted is presented in section 8.4.2.

An early risk register was developed for this assessment. The full risk register can be found in Appendix E.

The following is a summary of what are considered to be the most significant risks to this corridor:

- scheme costs could exceed the budget. This could be as a result of initial under-estimation or error, or unexpectedly high construction inflation. The implications of this could range from needing to seek additional funding, or result in the scheme being suspended in favour of cheaper schemes;
- significant environmental risks exist for this corridor. The Main Valley SAC, which incorporates the Frosses Bog ASSI, has the potential to be adversely affected;
- geotechnical risks are high with any corridors to the west, but are particularly significant for Corridor 1. The ground conditions are known to comprise large areas of poorly drained peat of variable thickness;
- Corridor 1 passes through significant areas of the River Main floodplain. There are risks associated with the difficulties in providing compensation flood storage capacity.

9.6.3 Public Accounts

Based upon a coarse assessment of impact to public accounts, Table 9.3 summarises the public accounts for the Western 2 Corridor. An explanation of the composition of the table is provided in section 8.4.4.

Table 9.3: Public Accounts Table for Western 2 Corridor

	All Modes Total	**Road**	**Bus**
Local Government Funding			
Revenue	0	0	0
Operating Costs	0	0	0
Investment Costs	0	0	0
Developer & Other Contributions	0	0	0
Grant/ Subsidy Payments	0	0	0
NET IMPACT	**0**	0	0
Central Government Funding			
Revenue	0	0	0
Operating Costs	5,661	5,661	0
Investment Costs	37,930	37,930	0
Developer & Other Contributions	0	0	0
Grant/ Subsidy Payments	0	0	0
Indirect Tax Revenue	-3,950	-3,950	0
NET IMPACT	**39,642**	39,642	0
TOTAL Present Value of Costs (PVC)	**39,643**		

9.6.4 Transport Economic Efficiency

A summary of the coarse transport economic efficiency assessment is provided below in Table 9.4.

Table 9.4: Economic Efficiency of the Transport System (TEE) for the Western 2 Corridor

	All Modes Total	**Road**		**Bus**
Consumers				
User Benefits (£000s)				
Personal Travel				
Travel Time	32,419	32,419		0
Vehicle Operating Costs	-2,963	-2,963		0
User Charges	0	0		0
During Construction & Maintenance	-9	-9		0
NET CONSUMER BENEFITS	**29,447**	29,447		0
Business				
User Benefits		Personal	Freight	Passengers
Travel Time	49,584	36,068	13,516	0
Vehicle Operating Costs	-3,154	-87	-3,067	0
User Charges	0	0	0	0
During Construction & Maintenance	-17	-12	-5	0
Sub Total	**46,413**	35,969	10,444	0
Private Sector Provider Impacts				
Revenue	0			0
Operating Costs	0			0
Investment Costs	0			0
Grant/ Subsidy	0			0
Sub Total	0			0
Other Business Impacts				
Developer Contributions	0	0		0
NET BUSINESS IMPACTS	**46,413**			
TOTAL (£000)				
Present Value of Transport Economic Efficiency Benefits	**75,860**			

Table 9.5 provides an overall summary of the economic performance of the Western 2 Corridor.

Table 9.5: Summary of Monetised Costs and Benefits for Western 2 Corridor

Cost or Benefit	Sum (£000)	Comments
Consumer User Benefits	29,447	
Business User benefits	46,413	
Private sector Provider Impacts	0	
Other Business Impacts	0	
Accident Benefits	0	
Carbon Benefits	-561	
Present Value of Benefits (PVB)	**75,299**	
Local Government Funding	0	
Central Government Funding	39,147	
Present Value of Costs (PVC)	**39,642**	
Overall Impacts		
Net Present Value (NPV)	**35,658**	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	**1.899**	BCR=PVB/PVC

An explanation of the composition of tables 9.4 and 9.5 is provided in section 8.4.5.

It can be seen from table 9.5 that the results of the coarse economic assessment would indicate that the Western 2 Corridor would be likely to deliver a positive benefit to cost ratio (BCR) of 1.90, with a net present value (NPV) of over £35 million.

However, these results should be read in conjunction with the assumptions and limitations listed in section 8.4.5.

9.6.5 Reliability

Reliability has not been assessed for this stage 1 assessment, as discussed in section 8.4.3.

9.6.6 Wider Economic Impacts

The wider economic impacts objective has not been assessed for this stage 1 assessment. See section 8.5 for details.

9.7 Accessibility Objective

The accessibility objective has not been assessed for this stage 1 assessment. See section 8.5 for details.

9.8 Integration Objective

9.8.1 Transport Interchange

The transport interchange sub-objective has not been assessed for this stage 1 assessment. See section 8.6.1 for details.

9.8.2 Land Use Policy

The following land use policies would impact on Corridor 1:

- Conserving Peatlands Statement – The Government has produced a policy statement on conserving peatlands in Northern Ireland. The policy is currently under review; however, the emerging policy is likely to have a greater emphasis on maintaining, enhancing and restoring peatland habitat, particularly for lowland raised bog, blanket bog and fen habitats. Proposed new elements of the policy also refer to

maintaining and restoring the role of peatland in maintaining the hydrological integrity of the river basins. Therefore, any development on or adjacent to peatland habitats is likely to be in opposition with the objectives of a new and revised peatlands policy statement. The Western 2 Corridor would not maintain, enhance or restore the peatland habitat and thus would contravene the peatlands policy; and

- River Conservation Strategy – This corridor could have a significant impact on the River Main, its tributaries, and its floodplain, and therefore not comply with the objectives of the river conservation strategy, to maintain and enhance the ecological integrity and biodiversity of rivers.

9.8.3 Other Government Policies

The other Government policies that would also affect this corridor are listed as follows:

- *Planning Policy Statement 2 (PPS 2)* – This corridor would follow close to the Main Valley Bogs SAC, the Frosses Bog ASSI and the Killycreen & Frosses North SLNCI. There is the potential that this corridor could adversely impact upon these designated sites and thus conflict with the objectives of PPS 2;
- *Conservation (Natural Habitats) Regulations Northern Ireland 1995* – Because of the proximity to the SAC/ASSI's, this corridor would be closely investigated by EHS under the *Conservation of Natural Habitats & Wild Flora & Fauna Directive (92/43/EEC)* as transposed by the *Conservation (Natural Habitats) Regulations Northern Ireland 1995*. This corridor would be subject to an appropriate assessment under Part 6 of these regulations. The regulations state that only in the case of there being no alternative solutions and the scheme being carried out for imperative reasons of overriding public interest (which may be of a social or economic nature), would the competent authority agree to the scheme notwithstanding a negative assessment of the implications for the site. Considering the availability of alternatives to this corridor and the absence of imperative reasons of overriding public interest, it is unlikely that the competent authority would be satisfied with this as a viable alternative;
- *Draft Northern Area Plan 2010-2016* – This corridor is likely to conflict with the environmental polices proposed within the Draft Northern Area Plan 2010-2016;
- *Drainage (EIA) Regulations (Northern Ireland) 2001* – Under these regulations, the Department of Agriculture and Rural Development are required to consider whether any proposed drainage works are likely to have significant effects on the environment. It is likely that this western corridor would have a significant adverse impact on the hydrology and drainage conditions of the Main Valley Bogs SAC.
- *The Fisheries Act 1966 as amended 2001* – Under this Act, it is an offence to discharge deleterious matter into waters, which impact on fish, or spawning grounds. This western corridor intersects the River Main and a number of its tributaries thus requiring a number of potential crossings. There is the potential during construction and operation, for highway run-off to enter and pollute the River Main and its tributaries. This would also fall under the *Water Act (NI) 1999 and the Groundwater Regulations (NI) 1998*.
- *Planning Policy Statement 15* – This states that new development should ensure that it is not exposed to the direct threat of flooding, nor should it increase flooding elsewhere. This western corridor would traverse areas susceptible to flooding.

9.9 Corridor 1 - Assessment Summary

9.9.1 Overview

The Western 2 Corridor would provide the opportunity to deliver an almost wholly off-line solution to dualling the A26, which would allow construction with a minimal impact to existing traffic. It is considered that a dualling solution could be delivered in accordance with design standards with no obvious departures from standard required.

A major benefit of such an off-line solution would be that traffic management issues during construction would be minimised, with the vast majority of construction being away from the existing A26. However, as the majority of the route would be new off-line construction, this corridor (along with Corridors 5 and 6) would be likely to require the largest amount of land-take.

A significant proportion of this corridor would be required to pass through the River Main floodplain. This would require the road to be constructed on an embankment in the region of 2.0m to 2.5m in height. The implication of this requirement would be that the corridor would require a significant amount of imported fill material for its construction. In addition, the existing ground comprises a top layer of peat of varying thickness along the corridor. This top layer of poor ground would either need to be dug out and replaced, or ground improvement techniques would need to be adopted, such as piling.

An additional disbenefit of aligning the road over the River Main floodplain is that significant flood compensation measures would need to be included within the scheme. These might include establishing new areas of land to be re-profiled to become part of a new flood plain, or the removal of material within the existing floodplain to create more storage capacity. Both of these measures could have a significant detrimental environmental impact to the corridor.

However, a major advantage of the Western 2 Corridor would be that it would largely route the improved A26 away from residential properties and utilise land which is considered to be of relatively poor agricultural value. The corridor would be unlikely to directly impact upon any buildings or resisential properties but, depending upon confirmation of land boundaries, may affect land associated with residential properties.

9.9.2 Environment

The principal environmental issues associated with the development of Western 2 Corridor are as follows:

- discernible change in ambient noise levels across the River Main floodplain which are relatively low due to the introduction of a new dual carriageway and road traffic noise. A number of residential properties situated along the B93 (Killigan Road) and scattered farmhouses across the floodplain would experience significant in ambient noise levels currently being experienced. There is also likely to be noise benefits along the existing A26 due to the transference of through-traffic flows to the new roadway;
- introduction of a new source of vehicle exhaust emissions leading to a reduction in the existing local air quality of the nearest residential properties, sensitive ecological habitats (i.e. Frosses Bog ASSI, Killycreen North and Frosses North SLNCI) across the floodplain and areas of agricultural land. Potential air quality offsets associated with traffic reductions and improvements to travel conditions along the existing A26;
- construction of the new road corridor on embankment and/or structure above the floodplain to achieve the 1:100 year flood immunity level would result in the alignment being visually prominent and exposed for most of its length. The existing landscape and a number of key viewpoints would be adversely affected due to the loss and severance of existing agricultural land holdings, a reduction in vegetation cover and direct loss of sensitive ecological habitats, importation of significant volumes of spoil to raise ground levels to create suitable road base platform and embankments altering the natural profile of the land and introduce new bridge structures at watercourse crossings;
- direct loss of areas of raised bog, floodplain and fen mire habitats and the potential loss of a narrow section of the Killycreen North SLNCI which are known to support a variety of species (i.e. badger, otter) protected under the EC *Habitats Directive 79/43/EC* and the *Wildlife (Northern Ireland) Order 1985*. Indirect effects associated with road runoff pollution and altered surface water and groundwater patterns, sedimentation from road runoff which could adversely impact the ecological integrity of the Frosses Bog ASSI which also forms part of the Main Valley Bogs SAC, a European protected site;

- potential direct physical damage to unknown, buried or in-situ archaeological remains and paleoenvironmental deposits due to road construction across the floodplain;
- introduction of new, hard and impervious road pavement surfaces across the floodplain would increase the velocity and volume of road runoff, alter natural drainage patterns, reduce available flood storage capacity and obstruct the passage of floodwaters, and potentially pollute local watercourses and drainage lines, derogate local water quality of the River Main which is a designated as Economically Significant under the "*EC Fresh Fish Directive 78/659/EC*, and nutrient sensitive under the *Urban Waste Water Treatment Directive 91/271/EEC*;
- delivery of potential positive physical fitness and journey ambience due to improvements in road safety, road travel conditions and local to through traffic conflicts, and;
- A series of mitigation measures would be required in order to minimise the adverse impacts of a Western 2 Corridor. However, even with mitigation, there exists the potential for a significance adverse impact on the natural environment to remain.

9.9.3 Safety

It is considered that the Western 2 Corridor would improve traffic flow and provide a high speed transport corridor. The route improvement would remove private access onto the route, restricting all traffic turning movements to the grade separated junctions. Therefore the highway improvement would remove the current problems of poor overtaking opportunities; vehicles forming platoons behind slow-moving vehicles; and uncontrolled traffic movements on and off the carriageway (through private accesses). Therefore, the safety performance of the corridor should significantly improve in relation to the current situation.

However, improvements in road safety would be expected with all the corridors.

9.9.4 Economy

The estimated cost of the Western 2 Corridor is £54,259,000 (at 2005 Q1 prices). This cost estimate includes a 22% optimism bias, but no risk allowance.

The economic performance of the corridor is as follows:

- NPV: £35,658,000
- BCR: 1.90

9.9.5 Accessibility

No assessment of accessibility has been undertaken for this stage 1 assessment.

9.9.6 Integration

This corridor would be likely to significantly contravene the following land use and Government policies:

- Conserving Peatlands Statement;
- River Conservation Strategy;
- Planning Policy Statement 2 (PPS 2);
- Conservation (Natural Habitats) Regulations Northern Ireland 1995;
- Draft Northern Area Plan 2010-2016;
- Drainage (EIA) Regulations (Northern Ireland) 2001;
- The Fisheries Act 1966 as amended 2001; and
- Planning Policy Statement 15.

9.9.7 Assessment Summary Table

An assessment summary table for the Western 2 Corridor (Corridor 1) is presented in Appendix F.

10 Corridor 2 – Western 5

10.1 Introduction

The Western 5 Corridor would comprise a mixture of both on-line and off-line route improvement techniques. The southern half of the corridor would seek to utilise on-line dualling of the existing A26 from Glarryford to the A26/ Lisnasoo Road junction. Approximately 300m north of the Lisnasoo Road junction the corridor would gently deviate off-line to the west passing behind (to the west) of a roadside residential property 800m south of the Lisnasoo Road junction. The corridor would traverse a roughly straight line passing behind (and to the west of) several residential properties along the line of the existing A26 until it passed immediately to the west of the Logans retail facility. The corridor would continue parallel to the existing A26, at an offset of approximately 200m then rejoin the A26 at the junction with the A44 (Drones Road).

The Western 5 Corridor is presented on drawing A26-HWY-006 in Appendix A.

This chapter provides the broad assessment of the Western 5 Corridor (Corridor 2). A full description of this corridor is provided in Section 7.3.

10.2 Engineering Assessment

10.2.1 Geometry and Departures from Standard

The southern half of this corridor would improve the existing A26 from its current S2 form to D2AP. This section would need to be improved to meet the current horizontal and vertical design standards for a 120kph alignment.

It is considered that it would be possible to design a horizontal and vertical alignment within this corridor that would not require any departures from standard. However, the section of on-line widening required for this corridor would be likely to comprise a mixture of widening techniques.

10.2.2 Junctions

Junction improvements, or new junctions would be required on the A26 for intersections with the following side roads:

- B64 (Station Road/ Springmount Road – Glarryford crossroads);
- Lisnasoo Road;
- B93 (Killagan Road); and
- A44 Drones Road.

10.2.3 Structures

Bridge numbers 10211 and 10212 which cross the River Clogh at the southern end of the scheme are considered to be outside the study area, and therefore outside the scope of this assessment and have not been considered at this stage.

This corridor would cross the Cloghmills Water. It is probable that this crossing would require a bridge structure rather than a simple culvert.

In addition, the northern end of the corridor contains a complex network of tributaries and streams distributed across the floodplain. This would result in a large number of culverts being required to avoid disruption to these minor tributaries.

For the purposes of cost-estimation, the assumed junction strategy includes for some grade separation through compact grade separated junctions (see Section 5.4). For this corridor that would result in thee new road bridges taking the side road over the new A26.

The route of this corridor would impact upon existing access arrangements for both the farming community and residential properties. In certain cases it may be appropriate to investigate the provision of alternative access arrangements which might include additional lengths of access track, relocated accesses, or even accommodation underpasses in exceptional circumstances.

10.2.4 Water Quality and Highway Drainage

The southern part of this corridor would seek to maximise the use of the existing A26 corridor and as a result should not directly impact upon the adjacent 1:100 year River Main flood plain. At the point at which the corridor moves off-line to the west from the existing A26 route, the corridor would follow immediately adjacent to the flood plain and occasionally passes into it (see drawing number A26-ENV-003, Appendix D). Where the corridor would be within the floodplain, it would need to be constructed on a 2.0m to 2.5m embankment to ensure that the road construction remained above the associated 1 in 100 year flood level. Compensatory flood areas would have to be provided to replace any areas of the flood plain lost by the footprint of the scheme.

The corridor crosses the Cloghmills Water as well as the Drumadoon watercourse and it is assumed that both crossings would require bridge structures as with the existing A26 route. In addition, the route crosses five Rivers Agency designated and five undesignated minor watercourses as well as a number of bog reens. It is possible that the majority of the minor watercourses will require culverts with fish beds and otter ledges and it should be assumed that all bog reens will at least have to be culverted.

It is anticipated that the highway surface water run-off will generally be discharged into the associated River Main tributaries and watercourses. These outfalls would require pollution control provision as well as, almost certainly, attenuation facilities. Keeping the petrol interceptors above the flood level could be difficult and with any attenuation pond requiring excavations to be at least 1.0m below the outfall level, this could lead to ground water problems in certain locations.

It should be noted that there are two low points on the existing A26 route where the only possible discharge points are directly into the Frosses bog. If these discharge points are maintained in the new scheme, the treatment requirements for the highway surface water run-off at these points are likely to be more onerous and expensive than the standard petrol interceptor provision.

Emergency spillage ponds may also be required at the four proposed junctions for this corridor depending on traffic flows. These normally have a capacity of 50 cubic metres and are sited at the associated outfall. The construction of the spillage ponds at all four junction outfalls could encounter ground water problems although this is not thought to be a significant risk at the proposed Lisnasoo Road Junction.

The surface water drainage strategy for the scheme would need to be agreed with the Rivers Agency and the Environment and Heritage Service and this would be undertaken during the stage 2 assessment.

10.2.5 Public/ Private Utility Services

The majority of the existing public and private services known to be present within the study area appear to be limited to the existing A26 route corridor and the adjacent B93 (Killagan Road) and Old Frosses Road corridors.

This corridor utilises the existing A26 corridor for the southern half before moving off-line and intersecting the B93 (Killagan Road) west of its current junction with the existing A26. The following existing services will potentially be affected:

- the southern half of this corridor proposes on-line widening of the existing A26 which carries longitudinal BT underground fibre-optic cables along this whole length and a Water Service water main from a point just north of the proposed Lisnasoo Road junction;
- for this southern half, the corridor also intersects a Water Service water main, two 33kV overhead NIE cable and three 11kV overhead NIE cables;
- as the corridor moves off-line from the A26 towards the B93 (Killagan Road), it intersects a further two 33kV overhead NIE cables and two 11kV overhead NIE cables;

- where the corridor crosses the B93 (Killagan Road), it intersects a BT underground fibre-optic cable, an 11kV overhead NIE cable and a MV overhead NIE cable; and
- at the northern end tie-in, the proposed junction with the A44 (Drones Road) utilises a section of the existing A26 corridor which carries BT underground fibre-optic cables and a Water Service water main.

The level of impact on these existing utility services and the associated diversion requirements will be assessed and confirmed during the stage 2 assessment. An allowance has been included within the cost estimate for this corridor for utility service diversion.

10.2.6 Geotechnical Issues

Corridor 2 would closely follow the existing A26 corridor between Glarryford and Lisnasoo Road, along the eastern edge of the River Main valley bottom. However, as this margin is irregular, sections of the on-line widening corridor would almost certainly be onto the peaty and alluvial material of the valley bottom.

The initial section, for approximately 1.3km north of the B64 (Springmount Road and Station Road - Glarryford crossroads), is generally underlain by glacial till, but includes a minor valley 0.5km north of Glarryford, where poor ground conditions comprising alluvial and peaty soils are likely to be present. There is an existing petrol filling station on the eastern side of the existing A26 in this section. This is potentially a source of contaminated land.

In the region of the Frosses Trees, the corridor would cross the eastern edge of a poorly drained, peaty area that includes the eastern edge (and undesignated section) of the Frosses Bog. These low lying areas will probably require an embankment, with the probable removal or treatment of the alluvial and peaty deposits beneath.

Between the two Frosses sections a drumlin hill is present, which would require a cutting into glacial till material.

North of the Frosses section, to the west of the existing A26, the ground is a mixture of alluvium and glacial deposits and glacial tills, before becoming peaty soil once more to the north of the Logans retail facility.

10.2.7 Impact Upon Buildings and Property

Corridor 2 would be expected to have a limited impact upon residential properties or other buildings within the study area.

The corridor would pass close to a number of residential properties and further, more detailed, assessment at Stage 2 would be required to better assess the potential impact upon these properties. In addition, subject to confirmation of land ownership boundaries, some impact to land associated with other buildings may result.

10.2.8 Construction Issues

Existing ground conditions indicate that several major sections of this corridor would pass over poor quality, peaty ground. This would require either ground improvement works or removal of the unsuitable material from site. This would increase the amount of required import material.

Possible sourcing of fill material has not been considered at this stage of assessment.

Traffic management is likely to be a significant constraint for this corridor. It is likely that large scale traffic management would be required for much of the duration of the construction works.

Additionally, for the off-line sections, where the route passes over the River Main floodplain, an embankment solution would be required. This could result in lengthy periods of embankment consolidation.

The traffic management issues associated with this corridor together with potential embankment consolidation could increase the length of the construction period.

10.3 Traffic Assessment

10.3.1 Introduction

The transport impact of this corridor has been assessed on a preliminary basis. At this coarse stage of assessment, there is little difference between any of the corridors assessed with respect to traffic movements

10.3.2 Traffic Flow Changes

An estimate of road network flows for this corridor has been made. Detailed alignment and junction layouts have not yet been determined, the forecast flows, at this stage, for an improved A26 are therefore broad estimations, and assume that virtually all existing A26 traffic would transfer onto the new A26 dual carriageway for at least part of their journey.

For this stage 1 assessment it has been assumed that flow patterns on side roads would remain as with the present case.

Table 10.1 shows the broadly estimated flows on each road link for 2012, the notional year of opening, and for 2027, the design year, with the new A26 improvement in place. It has been assumed that a nominal number of vehicles per day transfer from the new A26 dual carriageway onto the old A26, based upon the limited number of properties along the remaining Old A26 route.

The results of this early traffic assessment are presented graphically in Figure 10.1 (overleaf).

It should be noted that the flows given in Table 10.1 are preliminary estimates. Origin-destination data was unavailable at the time of this study, and thus detailed estimating of re-routing of traffic was not possible. It is expected that this work should be undertaken at stage 2 should this corridor be progressed.

Figure 10.1: Traffic Flow Western 5 Corridor

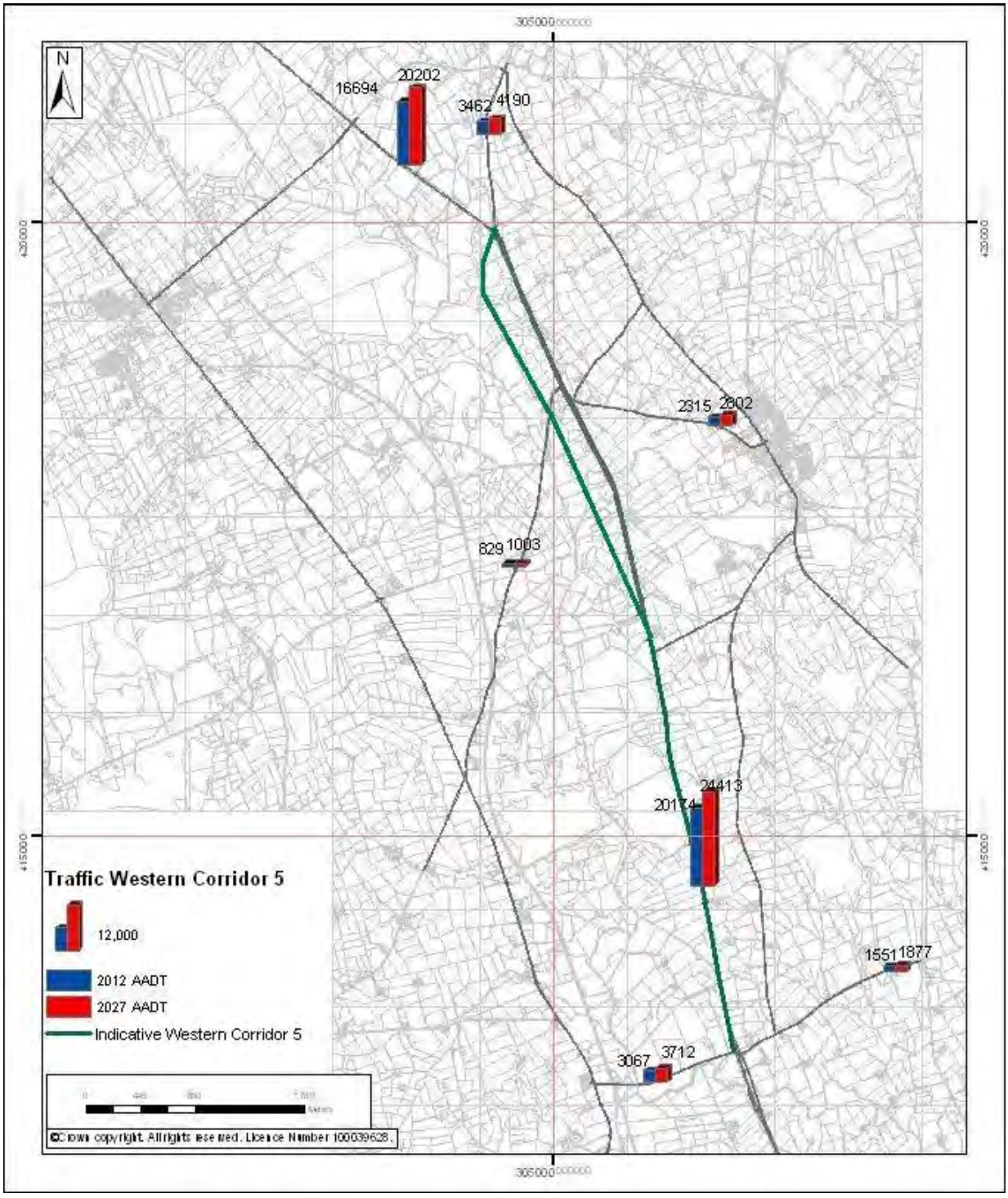


Table 10.1: Estimated Forecast Flows with A26 Improvement in place

Road	Direction of Flow	2012 Year of Opening AADT	2027 AADT
New A26 Improvement, north of B64	**northbound**	**10,051**	**12,163**
	southbound	**10,123**	**12,250**
(Old A26) Frosses Road	northbound	30	42
	southbound	30	43
B64 (Station Road), west of A26	*eastbound*	1,524	1,844
	westbound	1,543	1,868
B64 (Springmount Road) east of A26	*eastbound*	778	942
	westbound	773	935
Lisnasoo Road	*eastbound*	1,076	1,303
	westbound	1,033	1,250
B93 (Killagan Road), west of A26	*northbound*	397	480
	southbound	432	523
B94 (Drumadoon Road), east of A26	*eastbound*	1,184	1,433
	westbound	1,131	1,369
A44 (Drones Road), north of A26	*northbound*	1,679	2,032
	southbound	1,783	2,158

10.4 Environment Objective

The potential environmental issues associated with the development of the Western 5 Corridor would reflect those encountered by the Central Corridor (refer to Section 12.4) to a point just beyond the existing A26/ Lisnasoo Road junction. From this point, the corridor deviates to the west of the existing A26 across improved grassland and areas of floodplain fen or mire before crossing the Cloghmills Water and B93. It continues to pass across the eastern edge of the River Main floodplain and several areas of raised bog before its northern 'tie-in' with the A44 (Drones Road) junction.

There are approximately 45 and 57 residential dwellings within 200m and 300m, respectively, of this new road corridor which would be sensitive to both new and increased levels of road traffic noise and vehicle emissions from the existing A26 and new section of offline road corridor. This corridor would increase ambient noise levels and reduce local air quality through increases in vehicle emissions and would potentially entrap the western and eastern boundaries of 12 residential properties located between the existing A26 and the offline section.

The landscape along the offline section of this corridor is generally low-lying and flat with open, largely uninterrupted views out across the River Main floodplain. Sections of the offline corridor would be constructed on embankment above the floodplain which would alter the profile of this part of the floodplain, creating an artificial feature that is visually prominent in both immediate and certain longer distance views, particularly from elevated ground to both the east and west. In the vicinity of the Cloghmills Water crossing, this corridor would pass through a designated 'nutrient sensitive area' under the *EC Urban Waste Water Treatment Directive 91/271/EC* and under the *Nitrates Directive 91/676/EEC.* The Cloghmills Water is also designated an economically signficiant river under the *Freshwater Fish Directive 78/659/EEC.*

The nearest built heritage feature of significance to this road corridor is Drumadoon House, a listed building, located approximately 200m to the east at the junction of the A26/ B94 (Drumadoon Road) with the existing A26. The new road corridor would not adversely affect the appearance nor setting of this listed feature in the local landscape. In contrast, there is the potential for unknown, buried or in-situ archaeological remains to be directly disturbed or damaged during road construction, particularly in the areas of raised bog and floodplain and fen mire.

This would traverse approximately 1 km of the River Main 1:100 year floodplain and cross the Cloghmills Water and a number of smaller watercourses and drainage lines which ultimately discharge into the River Main. Whilst, there is a flooding risk associated with the development of this new corridor it is considered to be low with the potential loss of flood storage capacity estimated to be approximately 5.6 ha. There would be a direct impact on the thin belts of riparian habitat which straddle the watercourses crossed by this corridor through vegetation removal and construction of new bridge or culvert structures. Furthermore, pollution incidents occurring along or in the vicinity of these watercourses would have the potential to adversely impact on local water quality and aquatic biota.

The development of this corridor could potentially impact on the hydrological processes connecting the Main Valley Bogs SAC, namely the Caldanagh and Dunloy bogs in the north with the Frosses Bog in the south which could adversely impact the ecological integrity of this sensitive bog system. Further investigations would be required during the next stage of the design development process to evaluate this issue in more detail. A number of high value habitats would be directly impacted by the offline section of this corridor such as areas of raised bog, floodplain and fen mire which are known to support populations of protected species. The results of recent wintering surveys indicated that otters are present along the River Main and in the vicinity of its confluence with the Cloghmills Water. A small main or outlying badger sett was also identified a short distance upstream of the River Main and Cloghmills Water confluence and may need to be relocated to accommodate this new corridor as currently proposed. Appropriate fauna mitigation measures would need to be provided to ensure that movement pathways could be maintained across the new road (i.e. dedicated fauna underpasses and fauna-proof fencing) in order to minimise the potential for wildlife mortality from 'road-kill'.

A series of appropriate mitigation measures would be identified as part of the Stage 2 Scheme Assessment work in order to minimise the potential for any adverse environmental impacts associated with the development of Western 5 Corridor. Mitigation measures for Western 5 Corridor would be similar to those detailed for the Central Corridor.

10.5 Safety Objective

10.5.1 Accidents

It is likely that improving the existing S2 carriageway to a D2AP carriageway would improve the safety performance of the A26. The congested nature of the existing route and the lack of safe overtaking opportunities currently result in a high proportion of shunt-type accidents. Improving the design standard of the route and the capacity is likely to lead to the A26 becoming a much safer, high-speed transport corridor.

The is to be considered in greater detail at Stage 2, but at this stage it has been assumed that access to the improved A26 would be restricted to the main grade separated junctions only, with no individual private access.

It is considered that this corridor would be likely to reduce the potential for accidents associated with the following:

- Pedestrians. There would be little requirement for pedestrians to use the Corridor 2 transport corridor as it would not pass through any residential areas. Pedestrian would be far more likely to utilise the existing A26 corridor, which would have a greatly reduced throughput of traffic and would become a more pleasant pedestrian environment; and
- Vehicles using private direct accesses off the main road. The standard of the improved A26 highway would not permit direct private access onto the main carriageway. Access would be routed via the proposed key junctions. This will create a safer environment for vehicles entering and leaving the route.

Given the early stage of design for this study, it has not been possible to undertake a quantitative analysis to assess accident rates for the proposed route. However, the above

qualitative assessment suggests accident rates for the road should reduce significantly as a result of this corridor being implemented.

10.5.2 Security

Given the rural nature of the A26 study area, security is unlikely to be a factor in deciding upon corridor preference. Therefore no assessment of security has been undertaken at this stage of assessment.

10.6 Economy Objective

10.6.1 Cost Estimate

The cost estimate for this corridor has been based on the following information:

- 4.0km of off-line dual carriageway;
- 3.0km of dual carriageway based along the existing route;
- 2.2km of access roads to dwellings;
- 0.7km of feeder roads;
- three overbridges;
- three small river crossings;
- one roundabout; and
- Piled foundations through 1.7km of peat bog. An alternative estimate, based on excavation of the peat material in lieu of piling, was assessed to be a higher cost, therefore a piling solution has been included in this stage 1 cost estimate. However, this will be reviewed during the stage 2 assessment.

The following earthworks quantities have been estimated and priced:

- earthworks cut volume 346,979m^3;
- earthworks fill volume 473,252m^3; and
- topsoil volume 82,080m^3.

Given the early stage in the design process for this assessment, it was necessary to make a number of assumptions to develop a stage 1 cost estimate. These assumptions are listed below:

- agricultural land quality is relatively poor to the west of the existing A26 and land cost has therefore been assumed as £5,000 per acre (as advised by VLA);
- given the relatively poor land quality to the west of the A26, farm or property severance is likely to be limited. Compensation costs have been assumed at 10% of the scheme cost;
- all roads require temporary fencing;
- all roads require boundary fencing;
- safety fencing has been allowed for the full length of the central reserve;
- an allowance for safety fencing at junctions;
- all cut material is to be reused on site;
- 475mm thick road construction.

The total estimated cost of this corridor, including a 22% optimism bias (see Section 8.4.2) is **£52,087,000**. A summary of the cost-estimate is provided in Table 10.2.

Table 10.2: Cost-estimate for Western 5 Corridor

Cost Item	Cost (£) - 2006 Q4	% of cost
Preliminaries	£ 4,785,718.12	10.58%
Site Clearance	£ 97,349.32	0.22%
Fencing & env. barriers	£ 386,560.67	0.85%
Safety fences	£ 685,289.27	1.51%
Drainage	£ 2,235,252.35	4.94%
Earthworks	£ 11,182,083.14	24.72%
Pavements	£ 6,880,980.71	15.21%
Kerbs & footpaths	£ 453,319.62	1.00%
Traffic signs & markings	£ 417,123.71	0.92%
Street lighting	£ 369,167.24	0.82%
Electrical works	£ 15,004.23	0.03%
Landscaping	£ 568,597.44	1.26%
Overbridges	£ 1,500,000.00	3.32%
River crossings	£ 600,000.00	1.33%
Accommodation works	£ 928,261.14	2.05%
Statutory bodies	£ 1,104,870.59	2.44%
Sub total	**£ 32,209,577.55**	71.20%
Contractor's O&P @ 10%	£ 3,220,957.76	7.12%
Sub total	**£ 35,430,535.31**	78.32%
Land costs	£ 707,821.88	1.56%
Compensation costs	£ 3,543,053.53	7.83%
Sub total	**£ 39,681,410.72**	87.72%
Preparation (9%)	£ 3,571,326.96	7.89%
Supervision (5%)	£ 1,984,070.54	4.39%
Sub total	**£ 45,236,808.22**	100.00%
Optimism Bias (22%)	£ 9,952,097.81	22.00%
TOTAL ESTIMATED COST (2006 Q4)	**£ 55,188,906.03**	
TOTAL ESTIMATED COST (2005 Q1 @ - 5.62%)	**£ 52,087,289.51**	

10.6.2 Risk

A risk assessment was carried out for this corridor. The methodology adopted is presented in section 8.4.2.

An early risk register was developed for this assessment. The full risk register can be found in Appendix E.

The following is a summary of what are considered to be the most significant risks to this corridor:

- scheme costs could exceed the budget. This could be as a result of initial under-estimation or error, or unexpectedly high construction inflation. This could result in the need for additional scheme funding to be sourced or potentially the scheme being suspended in favour of other, cheaper schemes;
- environmental risks exist for this corridor. The corridor would pass close to the Frosses Bog ASSI, and the potential for edge effects would exist. In addition, the corridor would pass through the North Frosses SLINCI. There is therefore a risk of objection to this route on environmental grounds;

- geotechnical risks are considered relatively significant for this corridor. The ground conditions are known to comprise areas of poorly drained peat of variable thickness. The exact extent of the unsuitable material is not known at this stage;
- this corridor passes through some areas of the River Main floodplain. There are risks associated with the difficulties in providing compensation flood storage capacity; and
- approximately 50% of this corridor is considered to be on-line widening. There are risks associated with traffic management for on-line works.

10.6.3 Public Accounts

Based upon a coarse assessment of impact to public accounts, Table 10.3 summarises the public accounts for the Western 5 Corridor. An explanation of the composition of the table is provided in section 8.4.4.

Table 10.3: Public Accounts Table for Western 5 Corridor

	All Modes Total	**Road**	**Bus**
Local Government Funding			
Revenue	0	0	0
Operating Costs	0	0	0
Investment Costs	0	0	0
Developer & Other Contributions	0	0	0
Grant/ Subsidy Payments	0	0	0
NET IMPACT	**0**	0	0
Central Government Funding			
Revenue	0	0	0
Operating Costs	4,003	4,003	0
Investment Costs	36,429	36,429	0
Developer & Other Contributions	0	0	0
Grant/ Subsidy Payments	0	0	0
Indirect Tax Revenue	-2,822	-2,822	0
NET IMPACT	**37,610**	37,610	0
TOTAL Present Value of Costs (PVC)	**37,610**		

10.6.4 Transport Economic Efficiency

A summary of the coarse transport economic efficiency assessment is provided below in Table 10.4.

Table 10.4: Economic Efficiency of the Transport System (TEE) for the Western 5 Corridor

	All Modes Total	**Road**		**Bus**
Consumers				
User Benefits (£000s)				
Personal Travel				
Travel Time	34,602	34,602		0
Vehicle Operating Costs	-1,680	-1,680		0
User Charges	0	0		0
During Construction & Maintenance	-811	-811		0
NET CONSUMER BENEFITS	**32,111**	32,111		0
Business				
User Benefits		Personal	Freight	Passengers
Travel Time	53,619	39,114	14,505	0
Vehicle Operating Costs	-1,545	426	-1,971	0
User Charges	0	0	0	0
During Construction & Maintenance	-1,677	-1,204	-473	0
Sub Total	**50,397**	38,336	12,061	0
Private Sector Provider Impacts				
Revenue	0			0
Operating Costs	0			0
Investment Costs	0			0
Grant/ Subsidy	0			0
Sub Total	0			0
Other Business Impacts				
Developer Contributions	0	0		0
NET BUSINESS IMPACTS	**50,397**			
TOTAL (£000)				
Present Value of Transport Economic Efficiency Benefits	**82,508**			

Table 10.5 provides an overall summary of the economic performance of the Western 5 Corridor.

Table 10.5: Summary of Monetised Costs and Benefits for Western 5 Corridor

Cost or Benefit	Sum (£000)	Comments
Consumer User Benefits	32,111	
Business User benefits	50,397	
Private sector Provider Impacts	0	
Other Business Impacts	0	
Accident Benefits	0	
Carbon Benefits	-404	
Present Value of Benefits (PVB)	**82,104**	
Local Government Funding	0	
Central Government Funding	37,610	
Present Value of Costs (PVC)	**37,610**	
Overall Impacts		
Net Present Value (NPV)	**44,494**	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	**2.183**	BCR=PVB/PVC

An explanation of the composition of tables 10.4 and 10.5 is provided in section 8.4.5.

It can be seen from table 10.5 that the results of the coarse economic assessment would indicate that the Western 5 Corridor would be likely to deliver a positive benefit to cost ratio (BCR) of 2.18 with a net present value (NPV) of over £44 million.

However, these results should be read in conjunction with the assumptions and limitations listed in Section 8.4.5.

10.6.5 Reliability

Reliability has not been assessed for this stage 1 assessment, as discussed in section 8.4.3.

10.6.6 Wider Economic Impacts

The wider economic impacts objective has not been assessed for this stage 1 assessment. See section 8.5 for details.

10.7 Accessibility Objective

The accessibility objective has not been assessed for this stage 1 assessment. See section 8.5 for details.

10.8 Integration Objective

10.8.1 Transport Interchange

The transport interchange sub-objective has not been assessed for this stage 1 assessment. See section 8.6.1 for details.

10.8.2 Land Use Policy

The following land use policies would impact on Corridor 2:

- Conserving Peatlands Statement – The Government has produced a policy statement on conserving peatlands in Northern Ireland. The policy is currently under review; however, the emerging policy is likely to have a greater emphasis on maintaining, enhancing and restoring peatland habitat, particularly for lowland raised bog, blanket bog and fen habitats. Proposed new elements of the policy also refer to

maintaining and restoring the role of peatland in maintaining the hydrological integrity of the river basins. Therefore, any development on or adjacent to peatland habitats is likely to be in opposition with the objectives of a new and revised peatlands policy statement. The Western 5 Corridor would not maintain, enhance or restore the peatland habitat and thus would contravene the peatlands policy; and

- River Conservation Strategy – This corridor could have a minor impact on the River Main, its tributaries, and its floodplain, and therefore would not comply with the objectives of the river conservation strategy, to maintain and enhance the ecological integrity and biodiversity of rivers. However, the area over which this corridor contravenes the policy is limited.

10.8.3 Other Government Policies

The other Government policies that would also affect this corridor are listed as follows:

- *Planning Policy Statement 2 (PPS 2)* – There is the potential that this corridor could, in some way, have some impact upon the Main Valley Bogs SAC, the Frosses Bog ASSI and the Killycreen & Frosses North SLNCI. However, any potential impact to these designated sites is likely to be marginal, and therefore it therefore considered minor ;
- *Conservation (Natural Habitats) Regulations Northern Ireland 1995* – Because of the proximity to the SAC/ASSI's, this corridor would be closely investigated by EHS under the *Conservation of Natural Habitats & Wild Flora & Fauna Directive (92/43/EEC)* as transposed by the *Conservation (Natural Habitats) Regulations Northern Ireland 1995*. This corridor would be subject to an appropriate assessment under Part 6 of these regulations. The regulations state that only in the case of there being no alternative solutions and the scheme being carried out for imperative reasons of overriding public interest (which may be of a social or economic nature), would the competent authority agree to the scheme notwithstanding a negative assessment of the implications for the site. It is not considered this corridor would significantly impact upon these features, if at all, and therefore potential impact is considered minor;
- *Draft Northern Area Plan 2010-2016* – This corridor is likely to conflict with the environmental polices proposed within the Draft Northern Area Plan 2010-2016;
- *Drainage (EIA) Regulations (Northern Ireland) 2001* – Under these regulations, the Department of Agriculture and Rural Development are required to consider whether any proposed drainage works are likely to have significant effects on the environment. It is likely that this corridor could have a moderate adverse impact on the hydrology and drainage conditions of the Main Valley Bogs SAC.
- *The Fisheries Act 1966 as amended 2001* – Under this Act, it is an offence to discharge deleterious matter into waters, which impact on fish, or spawning grounds. This western corridor intersects the River Main and a number of its tributaries thus requiring a number of potential crossings. There is the potential during construction and operation, for highway run-off to enter and pollute the River Main and its tributaries. This would also fall under the *Water Act (NI) 1999 and the Groundwater Regulations (NI) 1998*.
- *Planning Policy Statement 15* – This states that new development should ensure that it is not exposed to the direct threat of flooding, nor should it increase flooding elsewhere. This corridor would traverse areas susceptible to flooding.

10.9 Corridor 2 - Assessment Summary

10.9.1 Overview

The Western 5 Corridor (Corridor 2) would provide a new A26 dual carriageway with the southern half of the scheme more central to the existing route and the northern half of the route off-line.

The 3.5km section required to be constructed more central to the existing route would be likely to involve considerable disruption to road traffic and extensive traffic management would be required. However, the northern half of the scheme would be wholly off line, which would allow construction with a minimal impact to existing traffic. It is considered that a dualling solution could be delivered in accordance with design standards with no obvious departures from standard required.

Corridor 2 has the potential to impact upon a small number of residential properties.

A small proportion of this corridor would pass through the River Main floodplain. In this vicinity, this would require the road to be constructed on an embankment in the region of 2.0m to 2.5m in height above the floodplain. The implication of this requirement would be that the corridor would require additional imported fill material for its construction. In addition, for the northern half of the corridor where the corridor would be off-line, the existing ground comprises a top layer of peat of varying thickness along the corridor. This top layer of poor ground would either need to be dug out and replaced or ground improvement techniques would need to be adopted, such as piling.

Some degree of flood compensation measures would need to be included within the scheme to offset any loss of floodplain as a result of the scheme. However, this is not considered a significant issue for this corridor.

Corridor 2 would involve a greater impact to existing utility service, particularly at the southern end, where the corridor would affect the existing A26 route.

10.9.2 Environment

The principal environmental issues associated with the development of the Western 5 Corridor would reflect those encountered by the Central Corridor (refer to Section 12) to a point just beyond the existing A26/ Lisnasoo Road junction. From this point to the northern 'tie-in' with the A44 (Drones Road) junction the key environmental issues for consideration would be attributed to:

- changes to the ambient noise and air quality conditions of residential properties, agricultural land holdings and sensitive ecological habitats situated along and in the vicinity of the off-line section of this corridor;
- changes and modification to the local landscape character and visual prominence of the new road corridor skirting the eastern edge of the floodplain in both immediate and long distance viewpoints;
- new crossing of the Cloghmills Water which is classified as 'Economically Significant' under the EC Freshwater Fish Directive 78/659/EC and situated within a designated 'nutrient sensitive area' under the EC Urban Waste Water Treatment Directive 91/271/EC;
- alteration to the setting and appearance of Drumadoon House, a listed building, located approximately 200m to the east near Logans retail facility and any potential unknown, buried or in-situ archaeological remains in the areas of raised bog and floodplain and fen mire;
- incursion into the 1:100 year floodplain of the River Main and loss of available flood storage capacity;
- alteration of overland drainage flows and patterns, and increased risk of pollution to local watercourses reducing water quality; and
- direct loss of raised bog and floodplain and fen mire habitats of interest to a variety of protected species and disruption to surface and groundwater flows and connections the Caldanagh and Dunloy Bogs ASSI in the north with the Frosses Bog ASSI in the south which form the Main Valley Bogs SAC, a European protected site.

10.9.3 Safety

It is considered that the Western 5 Corridor would improve traffic flow and provide a high speed transport corridor. The route improvement would remove private access onto the route, restricting all traffic turning movements to the grade separated junctions. Therefore, the highway improvement would remove the current problems of poor overtaking opportunities; vehicles forming platoons behind slow-moving vehicles; and uncontrolled traffic movements on and off the carriageway (through private accesses). Therefore the safety performance of the corridor should significantly improve in relation to the current situation.

However, improvements in road safety would be expected with all the corridors.

10.9.4 Economy

The estimated cost of the Western 5 Corridor is £52, 087,000 (at 2005 Q1 prices). This cost estimate includes a 22% optimism bias, but no risk allowance.

The economic performance of the corridor is as follows:

- NPV: £44,494,000
- BCR: 2.18

10.9.5 Accessibility

No assessment of accessibility has been undertaken for this stage 1 assessment.

10.9.6 Integration

This corridor would be likely to contravene the following land use and Government policies to a limited extent:

- Conserving Peatlands Statement;
- River Conservation Strategy;
- Planning Policy Statement 2 (PPS 2);
- Conservation (Natural Habitats) Regulations Northern Ireland 1995;
- Draft Northern Area Plan 2010-2016;
- Drainage (EIA) Regulations (Northern Ireland) 2001;
- The Fisheries Act 1966 as amended 2001; and
- Planning Policy Statement 15.

10.9.7 Assessment Summary Table

An assessment summary table for the Western 5 Corridor (Corridor 2) is presented in Appendix F.

11 Corridor 3 – Western 6

11.1 Introduction

The Western 6 Corridor would almost wholly utilise the existing A26 corridor. The only deviation to the existing A26 route would be to the north of the A26/ B94 (Drumadoon Road) junction.

The more central improvement section would be from the Glarryford junction to the A26/ B94 (Drumadoon Road) junction. The improvement through this section would be expected to be a combination of the improvement techniques of parallel improvement, contrained improvement and possibly off-line dualling close to the existing road, depending upon the particular constraints encountered. The 3km section between the Lisnasoo Road junction and the A26/ B94 (Drumadoon Road) junction has isolated residential properties on both sides of the existing A26, and it is likely that improvement of the carriageway would affect at least one of the properties.

To the north of the A26/ B94 (Drumadoon Road) junction, the corridor would move off-line to the west to avoid roadside residential properties down both sides of the existing A26. The new corridor would pass behind the properties, and rejoin the existing A26 at the junction with the A44 (Drones Road).

The Western 6 Corridor is presented on drawing A26-HWY-006 in Appendix A.

This chapter provides the broad assessment of the Western 6 Corridor (Corridor 3). A full description of this corridor is provided in Section 7.3.

11.2 Engineering Assessment

11.2.1 Geometry and Departures from Standard

Corridor 3 is largely an on-line widening solution. The only deviations away from the existing A26 route are where specific features are to be avoided (such as the Frosses Trees); where the existing route is deficient in terms of horizontal geometry; and for the northern most 1.4km where the corridor passes to the west of the existing A26 to avoid impact to residential property.

Where the proposed corridor would utilise the existing A26 alignment, both the horizontal and vertical alignment, would need to be improved to meet the current design standards for a 120kph alignment.

11.2.2 Junctions

Junction improvements, or new junctions would be required on the A26 for intersections with the following side roads:

- B64 (Station Road/ Springmount Road – Glarryford crossroads);
- Lisnasoo Road;
- B93 (Killagan Road)/ B94 (Drumadoon Road); and
- A44 Drones Road.

11.2.3 Structures

Bridge numbers 10211 and 10212 which cross the River Clogh at the southern end of the scheme are considered to be outside the study area, and therefore outside the scope of this assessment and have not been considered at this stage.

With the exception of small culverts, the only existing bridge likely to be affected by the proposals for Corridor 3 is bridge number 30466, which carries the existing A26 over Cloghmills Water approximately 700m south of the junction with the B94 (Drumadoon Road). The existing bridge is reported to be in good condition and is understood to have sufficient load carrying capacity to accommodate the future traffic conditions. The structure has an existing clear span of just under 10m, and would either need to be widened, or a parallel structure constructed to accommodate the additional carriageway.

Bridge no. 31487 is a culvert-type underbridge that conveys a stream underneath the A26 approximately 30m north of the A26/ A44 junction. This existing structure is documented as being 25m wide. Depending upon the alignment of the proposed improved A26 within this corridor, this structure could be affected, and would therefore be likely require some limited widening to accommodate the propose D2AP carriageway.

For the purposes of cost-estimation, the assumed junction strategy includes for some grade separation through compact grade separated junctions (see Section 5.4). For this corridor that would result in thee new road bridges taking the side road over the new A26.

The route of this corridor would impact upon existing access arrangements for both the farming community and residential properties. In certain cases it may be appropriate to investigate the provision of alternative access arrangements which might include additional lengths of access track, relocated accesses, or even accommodation underpasses in exceptional circumstances.

11.2.4 Water Quality and Highway Drainage

The majority of the Western 6 Corridor would seek to maximise the use of the existing A26 corridor and as a result should not directly impact upon the adjacent 1:100 year River Main floodplain. At the point at which the corridor moves off-line to the west from the existing A26 route, the corridor would follow immediately adjacent to the flood plain (see drawing number A26-ENV-003, Appendix D) and as a result, it is not considered to affect the floodplain sufficiently to require construction on embankment or require flood compensation measures.

The corridor crosses one of the major River Main tributaries, the Cloghmills Water and it is assumed that this crossing would require bridge structures as with the existing A26 route. In addition the route crosses five designated and five undesignated minor watercourses as well as a number of bog reens. It is possible that the majority of these minor watercourses will require culverts with fish beds and otter ledges and it should be assumed that all bog reens will at least have to be culverted.

It is anticipated that the highway surface water run-off will generally be discharged into the associated River Main tributaries and watercourses. These outfalls would require pollution control provision as well as, almost certainly, attenuation facilities. An attenuation pond would require excavations at least 1.0 m below the outfall level and in certain locations this could lead to problems with ground water.

It should be noted that there are two low points on the existing A26 route where the only possible discharge points are directly into the Frosses bog. If these discharge points are maintained in the new scheme, the treatment requirements for the highway surface water run-off at these points are likely to be more onerous and expensive than the standard petrol interceptor provision.

Emergency spillage ponds may also be required at the four proposed junctions for this corridor depending on traffic flows. These normally have a capacity of 50 cubic metres and are sited at the associated outfall. The construction of the spillage ponds at all four junction outfalls could encounter ground water problems although this is not thought to be a significant risk at the proposed Lisnasoo Road Junction.

It should also be noted that on sections of the existing road, between the proposed junctions with the B93 (Killagan Road) and Lisnasoo Road, there appears to be a spring line which may require additional drainage measures.

The surface water drainage strategy for the scheme would need to be agreed with the Rivers Agency and the Environment and Heritage Service and this would be undertaken during the stage 2 assessment.

11.2.5 Public/ Private Utility Services

The majority of the existing public and private services known to be present within the study area appear to be limited to the existing A26 route corridor and the adjacent B93 (Killagan Road) and Old Frosses Road corridors.

This corridor utilises the existing A26 corridor for three quarters of its length before moving off-line at the northern end. The following existing services will potentially be affected:

- for three quarters of its length, the corridor proposes on-line widening of the existing A26 which carries longitudinal BT underground fibre-optic cables along this whole length and a Water Service water main north of the point just north of the proposed Lisnasoo Road junction;
- for this on-line widening section before moving off-line to the west, the corridor also intersects a Water Service water main, four 33kV overhead NIE cables, six 11kV overhead NIE cables and four MV overhead NIE cables; and
- at the northern end tie-in, the proposed junction with the A44 (Drones Road) utilises a section of the existing A26 corridor which carries BT underground fibre-optic cables and a Water Service water main.

The level of impact on these existing utility services and the associated diversion requirements will be assessed and confirmed during the stage 2 assessment. An allowance has been included within the cost estimate for this corridor for utility service diversion.

11.2.6 Geotechnical Issues

This corridor would closely follow the existing A26 corridor, along the eastern edge of the River Main valley bottom. However, as this margin is irregular, sections of this corridor would almost certainly be onto the peaty and alluvial material of the valley bottom.

The initial 1.3km of the route, north of Glarryford, is generally underlain by glacial till, but includes a minor valley 0.5km north of Glarryford, where poor ground conditions comprising alluvial and peaty soils are likely to be present. There is an existing petrol filling station on the eastern side of the existing A26 in this section. This is potentially a source of contaminated land.

In the vicinity of the Frosses Trees the corridor would pass to the east of a poorly drained, peaty area that includes the eastern edge (and undesignated section) of the Frosses Bog. These low lying areas will probably require an embankment, with the probable removal or treatment of the alluvial and peaty deposits beneath.

Between the two Frosses sections a Drumlin Hill is present, which would require a cutting into glacial till material.

North of the Frosses section, the geology under the corridor is glacial till and drumlin terrain. Minor cutting into glacial till material may be required.

Where the A26 descends towards the Cloghmills Water valley, there is high groundwater, with numerous springs. Locally poor alluvial and peaty ground conditions are likely to be present, which will probably require removal or treatment below the shallow embankment that will probably be required for this section. On the existing A26 in this section there is a petrol filling station which is potentially the source of contaminated land.

From this point to the junction with the B94 (Drumadoon Road) the geology returns to glacial till.

North of the B94 (Drumadoon Road) junction, the final section of this corridor is characterised as alluvial and peaty soils, although this material may be thin in places.

11.2.7 Impact Upon Buildings and Property

Corridor 3 would be expected to have some impact upon residential properties or other buildings within the study area.

A large proportion of this corridor is based upon on-line improvement of the existing road. The existing A26 has a number of properties and other buildings along the line of the road. Improvement of the existing road would have some impact upon these properties. However, more detailed assessment at Stage 2 would be required to better assess the potential impact upon these properties. In addition, subject to confirmation of land ownership boundaries, some impact to land associated with other buildings may result.

11.2.8 Construction Issues

Existing ground conditions indicate that widening of the existing A26 is likely to encounter poor ground for a significant length. This would require either ground improvement works, or removal of the material from site. This would increase the amount of required import material.

Possible sourcing of fill material has not been considered at this stage of assessment.

The existing structures along the route would either need widening or improving, and it may even be considered appropriate to replace structures depending upon their condition.

Traffic management is likely to be a major constraint for this corridor. With the alignment being predominantly more central to the existing route, it is likely that significant traffic management would be required for the duration of the construction project, and potentially this could increase the length of the construction project in relation to the other corridors.

11.3 Traffic Assessment

11.3.1 Introduction

The transport impact of this corridor has been assessed on a preliminary basis. It should be noted that at this coarse stage of assessment, there is little difference, in terms of changes to traffic movements, between any of the corridors assessed.

11.3.2 Traffic Flow Changes

An estimate of road network flows for this corridor has been made. Detailed alignment and junction layouts have not yet been determined, the forecast flows for an improved A26 are therefore, at this stage, broad estimations, and assume that virtually all existing A26 traffic would transfer, for at least part of its journey, onto the new A26 dual carriageway.

It has been assumed for this stage 1 assessment that flow patterns on side roads would remain as with the present case.

Table 11.1 shows the broadly estimated flows on each road link for 2012, the notional year of opening, and for 2027, the design year, with the new A26 improvement in place. It has been assumed that a nominal number of vehicles per day transfer from the new A26 dual carriageway onto the old A26, based upon the limited number of properties along the remaining Old A26 route and the Ballylig Road.

The results of this early traffic assessment are presented graphically in Figure 11.1 overleaf.

It should be noted that the flows given in Table 11.1 are preliminary estimates. Origin-destination data was unavailable at the time of this study and thus detailed estimates of re-routing of traffic was not possible. It is expected that this work should be undertaken at stage 2 should this corridor be progressed.

Figure 11.1: Traffic Flows Western 6 Corridor

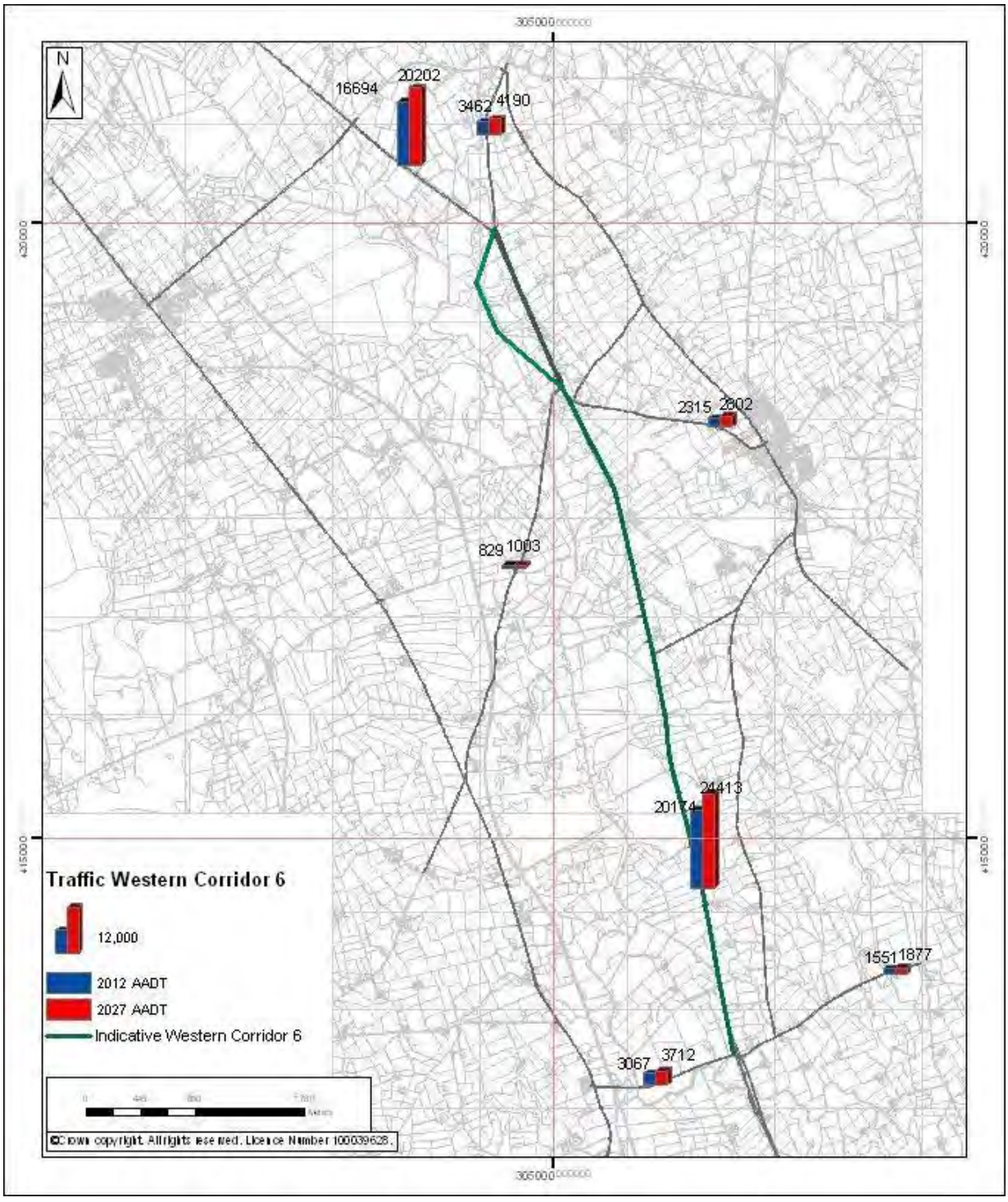


Table 11.1: Estimated Forecast Flows with A26 Improvement in place

Road	Direction of Flow	2012 Year of Opening AADT	2027 AADT
New A26 Improvement, north of B64	**northbound**	**10,051**	**12,163**
	southbound	**10,123**	**12,250**
(Old A26) Frosses Road	northbound	30	42
	southbound	30	43
B64 (Station Road), west of A26	*eastbound*	1,524	1,844
	westbound	1,543	1,868
B64 (Springmount Road), east of A26	*eastbound*	778	942
	westbound	773	935
Lisnasoo Road	*eastbound*	1,076	1,303
	westbound	1,033	1,250
B93 (Killagan Road), west of A26	*northbound*	397	480
	southbound	432	523
B94 (Drumadoon Road), east of A26	*eastbound*	1,184	1,433
	westbound	1,131	1,369
A44 (Drones Road), north of A26	*northbound*	1,679	2,032
	southbound	1,783	2,158

11.4 Environment Objective

The potential environmental issues associated with the development of the Western 6 Corridor reflect those encountered by the Central Corridor (refer to Section 12.4) up until the junction between the A26 and the B94 (Drumadoon Road). From this point, the Western 6 Corridor deviates a short distance to the west of the existing A26 across improved wet grassland, dry modified sphagnum bog and skirts several small of raised bog before its 'tie-in' with the A44 (Drones Road) junction.

There are approximately 50 and 58 residential dwellings within 200m and 300m (respectively) of this new road corridor which would be sensitive to both new and increased levels of road traffic noise and vehicle emissions from the existing A26 and new section of offline road corridor. This corridor would comprise a short length of new offline dualling extending from the A26 just to the north of the A26/ B94 junction to the northern 'tie-in' with the A44 (Drones Road) junction. It would increase ambient noise levels and reduce local air quality through increases in vehicle emissions and would potentially entrap the western and eastern boundaries of three residential properties located between the existing A26 and new road corridor section.

The landscape along this new road corridor is generally low-lying and flat with open, largely uninterrupted views out across the River Main floodplain from the existing A26. Sections of the offline component of this corridor would be constructed on embankment above the valley floor which would alter the profile of this part of the floodplain, creating an artificial feature that is visually prominent in both immediate and certain longer distance views, particularly from elevated ground to both the east and west.

The setting and appearance of Drumadoon House in the local landscape, a listed building, located immediately adjacent to the southbound carriageway of the existing A26 at the junction of the B94 could be affected by online widening. Furthermore, there is the potential for unknown, buried or in-situ archaeological remains to be directly disturbed or damaged during road construction, particularly in the areas of raised bog and floodplain and fen mire.

This corridor would traverse approximately 350m of the River Main 1:100 year floodplain and cross a small number of drainage lines flowing east to west across the proposed corridor to the River Main. Whilst, there is a flooding risk associated with the development of the offline section of this new corridor, it is considered to be low with the potential loss of flood storage capacity

estimated to be approximately 2.3 ha. There would be minimal impacts on riparian habitats and river corridors. Furthermore, pollution incidents occurring along or in the vicinity of local watercourses crossed by this corridor would have the potential to adversely impact on local water quality and aquatic biota.

The development of this corridor is unlikely to impact on the hydrological processes connecting the Main Valley Bogs SAC, namely the Caldanagh and Dunloy Bogs in the north with the Frosses Bog in the south. However, further work would be required during the next stage of the design development process to evaluate this issue in more detail. The alignment of this corridor also tends to skirt a small section of the eastern edge of the River Main floodplain. Habitats of high ecological value that would be affected by the offline section of this corridor include raised bog and floodplain and fen mire which are known to support populations of protected species. The results of recent wintering surveys recorded two bird species listed under Schedule 1 of the *Wildlife (Northern Ireland) Order 1985*, namely fieldfare and kingfisher.

A series of appropriate mitigation measures would be identified as part of the Stage 2 Scheme Assessment work in order to minimise the potential for any adverse environmental impacts associated with the development of Western 6 Corridor. Mitigation measures for Western 6 corridor would be similar to those detailed for the Central Corridor.

11.5 Safety Objective

11.5.1 Accidents

It is likely that improving the existing S2 carriageway to a D2AP carriageway would improve the safety performance of the A26. The congested nature of the existing route, and the lack of safe overtaking opportunities currently result in a high proportion of shunt-type accidents. Improving the design standard of the route, and the capacity, is likely to lead to the A26 becoming a much safer, high-speed transport corridor.

The junction strategy is to be considered in greater detail at stage 2, but at this stage it has been assumed that access to the improved A26 would be restricted to the main grade separated junctions. Therefore individual private access to the A26 would not be permitted, as is presently the case.

It is considered that this corridor would be likely to reduce the potential for accidents associated with the following:

- Pedestrians. There are a limited number of residential properties along the line of the existing A26, and given the high speed nature of the proposed route, pedestrian usage along the proposed improved A26 corridor would be likely to be restricted. Therefore, the potential for pedestrian and vehicle conflict would be greatly reduced to the current situation. However, one area of concern exists around the B94 (Drumadoon Road) junction. The Logans retail facility and Drumadoon House Tea Room could potentially create a pedestrian desire line between these two facilities. Should this corridor be progressed to the next stage, this issue will be considered further; and
- Vehicles using private direct accesses off the main road. The standard of the improved A26 highway would not permit direct private access onto the main carriageway. Access would be routed via the proposed key junctions. This will create a safer environment for vehicles entering and leaving the route.

Given the early stage of design for this study, it has not been possible to undertake a quantitative analysis to determine accident rates for the proposed route. However, the above qualitative assessment suggests accident rates for the road should reduce significantly as a result of this corridor being implemented.

11.5.2 Security

Given the rural nature of the A26 study area, security is unlikely to be a factor in deciding upon corridor preference. Therefore no assessment of security has been undertaken at this stage of assessment.

11.6 Economy Objective

11.6.1 Cost-Estimate

The cost- estimate for this corridor has been based on the following information:

- 2.0 km of off-line dual carriageway;
- 5.0 km of dual carriageway based along the existing route;
- 2.2 km of access roads to dwellings;
- 0.7 km of feeder roads;
- 3 nr overbridges;
- 2 nr small river crossings; and
- Piled foundations through 1.6 km of peat bog. (An alternative estimate, based on excavation of the peat material in lieu of piling, was also assessed, but this construction method was assessed to be a higher cost, therefore a piling solution has been included in this stage 1 cost-estimate. This, however, will be reviewed during the stage 2 assessment).

The following earthworks quantities have been estimated and priced:

- Earthworks cut volume 346,979 m^3;
- Earthworks fill volume 473,252 m^3; and
- Topsoil volume 82,080 m^3.

Given the early stage in the design process for this assessment, it was necessary to make a number of assumptions to develop a stage 1 cost estimate. These assumptions are listed below:

- agricultural land quality is relatively poor to the west of the existing A26 and land cost has therefore been assumed as £5,000 per acre (as advised by VLA);
- given the relatively poor land quality to the west of the A26, farm or property severance is likely to be limited. Compensation costs have been assumed at 10% of the scheme cost;
- All roads require temporary fencing;
- All roads require boundary fencing;
- Safety barrier allowed for the full length of the central reserve and an allowance at junctions;
- All cut material is to be reused on site;
- Raised rib edge line both sides; and
- 475 mm thick road construction.

The total estimated cost of this corridor, including a 22% optimism bias (see Section 8.4.2) is **£51,590,000**. A summary of the cost-estimate is provided in Table 11.2

Table 11.2: Cost-estimate for Western 6 Corridor

Cost Item	Cost (£) - 2006 Q4	% of cost
Preliminaries	£ 4,832,664.00	10.79%
Site Clearance	£ 98,304.27	0.22%
Fencing & env. barriers	£ 390,352.67	0.87%
Safety fences	£ 692,011.67	1.54%
Drainage	£ 2,257,179.23	5.04%
Earthworks	£ 10,894,530.61	24.32%
Pavements	£ 6,937,812.31	15.48%
Kerbs & footpaths	£ 457,766.49	1.02%
Traffic signs & markings	£ 421,215.52	0.94%
Street lighting	£ 372,788.61	0.83%
Electrical works	£ 15,151.41	0.03%
Landscaping	£ 574,175.14	1.28%
Overbridges	£ 1,500,000.00	3.35%
River crossings	£ 400,000.00	0.89%
Accommodation works	£ 937,366.99	2.09%
Statutory bodies	£ 1,115,708.91	2.49%
Sub total	**£ 31,897,027.83**	71.19%
Contractor's O&P @ 10%	£ 3,189,702.78	7.12%
Sub total	**£ 35,086,730.61**	78.31%
Land costs	£ 707,821.88	1.58%
Compensation costs	£ 3,508,673.06	7.83%
Sub total	**£ 39,303,225.56**	87.72%
Preparation (9%)	£ 3,537,290.30	7.89%
Supervision (5%)	£ 1,965,161.28	4.39%
Sub total	**£ 44,805,677.14**	100.00%
Optimism Bias (22%)	£ 9,857,248.97	22.00%
TOTAL ESTIMATED COST (2006 Q4)	**£ 54,662,926.11**	
TOTAL ESTIMATED COST (2005 Q1 @ - 5.62%)	**£ 51,590,869.66**	

11.6.2 Risk

A risk assessment was carried out for this corridor. The methodology adopted is presented in section 8.4.2.

An early risk register was developed for this assessment. The full risk register can be found in Appendix E.

The following is a summary of what are considered to be the most significant risks to this corridor:

- scheme costs could exceed the budget. This could be as a result of initial under-estimation or error, or unexpectedly high construction inflation;
- environmental risks exist for this corridor. The corridor would improve the existing A26 route past the Frosses Trees, and therefore would pass close to the Frosses Bog ASSI. There therefore exists the potential for edge effects to the ASSI;
- geotechnical risks are considered relatively significant for this corridor. The ground conditions to the north of the route are known to comprise areas of poorly drained peat of variable thickness. The exact extent of the unsuitable material is not known at this stage;

- approximately 75% of this corridor is considered to be on-line widening. There are risks associated with traffic management for on-line works; and
- potential exists to impact upon residential properties. Property prices and could fluctuate outside inflation rates, affecting the cost-estimate.

11.6.3 Public Accounts

Based upon a coarse assessment of impact to public accounts, Table 11.3 summarises the public accounts for the Western 6 Corridor. An explanation of the composition of the table is provided in section 8.4.4.

Table 11.3: Public Accounts Table for Western 6 Corridor

	All Modes Total	**Road**	**Bus**
Local Government Funding			
Revenue	0	0	0
Operating Costs	0	0	0
Investment Costs	0	0	0
Developer & Other Contributions	0	0	0
Grant/ Subsidy Payments	0	0	0
NET IMPACT	**0**	0	0
Central Government Funding			
Revenue	0	0	0
Operating Costs	3,402	3,402	0
Investment Costs	36,081	36,081	0
Developer & Other Contributions	0	0	0
Grant/ Subsidy Payments	0	0	0
Indirect Tax Revenue	-2,960	-2,960	0
NET IMPACT	**36,523**	36,523	0
TOTAL Present Value of Costs (PVC)	**36,523**		

11.6.4 Transport Economic Efficiency

A summary of the coarse transport economic efficiency assessment is provided below in Table 11.4.

Table 11.4: Economic Efficiency of the Transport System (TEE) for the Western 6 Corridor

	All Modes Total	**Road**		**Bus**
Consumers				
User Benefits (£000s)				
Personal Travel				
Travel Time	34,731	34,731		0
Vehicle Operating Costs	-1,936	-1,936		0
User Charges	0	0		0
During Construction & Maintenance	-1,413	-1,413		0
NET CONSUMER BENEFITS	**31,382**	31,382		0
Business				
User Benefits		Personal	Freight	Passengers
Travel Time	53,978	39,435	14,543	0
Vehicle Operating Costs	-1,868	335	-2,203	0
User Charges	0	0	0	0
During Construction & Maintenance	-2,931	-2,094	-837	0
Sub Total	**49,179**	37,676	11,503	0
Private Sector Provider Impacts				
Revenue	0			0
Operating Costs	0			0
Investment Costs	0			0
Grant/ Subsidy	0			0
Sub Total	0			0
Other Business Impacts				
Developer Contributions	0	0		0
NET BUSINESS IMPACTS	**49,179**			
TOTAL (£000)				
Present Value of Transport Economic Efficiency Benefits	**80,561**			

Table 11.5 provides an overall summary of the economic performance of the Western 6 Corridor.

Table 11.5: Summary of Monetised Costs and Benefits for Western 6 Corridor

Cost or Benefit	Sum (£000)	Comments
Consumer User Benefits	31,382	
Business User benefits	49,179	
Private sector Provider Impacts	0	
Other Business Impacts	0	
Accident Benefits	0	
Carbon Benefits	-425	
Present Value of Benefits (PVB)	**80,136**	
Local Government Funding	0	
Central Government Funding	36,523	
Present Value of Costs (PVC)	**36,523**	
Overall Impacts		
Net Present Value (NPV)	**43,613**	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	**2.194**	BCR=PVB/PVC

An explanation of the composition of tables 11.4 and 11.5 is provided in section 8.4.5.

It can be seen from Table 11.5 that the results of the coarse economic assessment would indicate that the Western 6 Corridor would be likely to deliver a positive benefit to cost ratio (BCR) of 2.19, with a net present value (NPV) of over £44million.

However, these results should be read in conjunction with the assumptions and limitations listed in Section 8.4.5.

11.6.5 Reliability

Reliability has not been assessed for this stage 1 assessment, as discussed in section 8.4.3.

11.6.6 Wider Economic Impacts

The wider economic impacts objective has not been assessed for this stage 1 assessment. See section 8.5 for details.

11.7 Accessibility Objective

The accessibility objective has not been assessed for this stage 1 assessment. See section 8.5 for details.

11.8 Integration Objective

11.8.1 Transport Interchange

The transport interchange sub-objective has not been assessed for this stage 1 assessment. See section 8.6.1 for details.

11.8.2 Land Use Policy

The following land use policies would impact on Corridor 3:

- Conserving Peatlands Statement – The Government has produced a policy statement on conserving peatlands in Northern Ireland. The policy is currently under review; however, the emerging policy is likely to have a greater emphasis on maintaining, enhancing and restoring peatland habitat, particularly for lowland raised bog, blanket bog and fen habitats. Proposed new elements of the policy also refer to maintaining and restoring the role of peatland in maintaining the hydrological integrity of the river basins. Therefore, any development on or adjacent to peatland habitats is likely to be in opposition with the objectives of a new and revised peatlands policy statement. The Western 6 Corridor would not maintain, enhance or restore the peatland habitat and thus would contravene the peatlands policy; and
- River Conservation Strategy – This corridor could have a minor impact on the River Main, its tributaries, and its floodplain, and therefore would not comply with the objectives of the river conservation strategy, to maintain and enhance the ecological integrity and biodiversity of rivers. However, the area over which this corridor contravenes the policy is limited.

11.8.3 Other Government Policies

The other Government policies that would also affect this corridor are listed as follows:

- *Planning Policy Statement 2 (PPS 2)* – There is the potential that this corridor could, in some way, have some impact upon the Main Valley Bogs SAC, the Frosses Bog ASSI and the Killycreen & Frosses North SLNCI. However, any potential impact to these designated sites is likely to be marginal, and therefore it therefore considered minor ;
- *Conservation (Natural Habitats) Regulations Northern Ireland 1995* – Because of the proximity to the SAC/ASSI's, this corridor would be closely investigated by EHS under the *Conservation of Natural Habitats & Wild Flora & Fauna Directive (92/43/EEC)* as transposed by the *Conservation (Natural Habitats) Regulations Northern Ireland 1995.* This corridor would be subject to an appropriate assessment under Part 6 of these regulations. The regulations state that only in the case of there being no alternative solutions and the scheme being carried out for imperative reasons of overriding public interest (which may be of a social or economic nature), would the competent authority agree to the scheme notwithstanding a negative assessment of the implications for the site. It is not considered this corridor would significantly impact upon these features, if at all, and therefore potential impact is considered minor;
- *Draft Northern Area Plan 2010-2016* – This corridor is likely to conflict with the environmental polices proposed within the Draft Northern Area Plan 2010-2016;
- *Drainage (EIA) Regulations (Northern Ireland) 2001* – Under these regulations, the Department of Agriculture and Rural Development are required to consider whether any proposed drainage works are likely to have significant effects on the environment. It is likely that this corridor could have a moderate adverse impact on the hydrology and drainage conditions of the Main Valley Bogs SAC.
- *The Fisheries Act 1966 as amended 2001* – Under this Act, it is an offence to discharge deleterious matter into waters, which impact on fish, or spawning grounds. This western corridor intersects the River Main and a number of its tributaries thus requiring a number of potential crossings. There is the potential during construction and operation, for highway run-off to enter and pollute the River Main and its tributaries. This would also fall under the *Water Act (NI) 1999 and the Groundwater Regulations (NI) 1998*.
- *Planning Policy Statement 15* – This states that new development should ensure that it is not exposed to the direct threat of flooding, nor should it increase flooding elsewhere. This corridor would traverse areas susceptible to flooding.

11.9 Corridor 3 - Assessment Summary

11.9.1 Overview

The Western 6 Corridor (Corridor 3) would provide a new section of dual carriageway for the A26 with the scheme largely using the existing road corridor. The main deviation away from the existing route would be to the north of the Logans retail facility, where the proposed corridor would pass to the west of two residential properties which from onto the existing A26. The proposed corridor would rejoin the existing A26 alignment at the junction with the A44 Drones Road.

It is considered it would be possible to provide a route along the proposed corridor which would conform to DMRB geometric standards for a 120kph design speed.

This corridor is likely to impact upon bridge number 30466 which carries the existing A26 over Cloghmills Water. This structure is of insufficient width to even carry one half of a full standard dual carriageway cross-section, and would therefore, as a minimum, need to be widened. However, if this corridor was progressed, a decision may be taken to replace the structure, depending upon more detailed condition assessments.

Increasing the cross-section of the existing A26 route could potentially create additional severance for farms which operate on both sides of the existing road. Accommodation structures may be required to facilitate farm operations.

Approximately 5.5km of this corridor would effectively be constructed more central to the existing route and would be likely to involve significant disruption to road traffic on the existing A26. Extensive traffic management would be required.

Corridor 3 has the potential to impact upon several residential properties.

Improvement of the existing A26 route would require the proposed corridor to pass through sections of poor ground (peat). This would be likely to result in ground improvement works being necessary to improve the quality of the road foundation.

Where the proposed corridor comes off- line to the west, the ground conditions are known to be poor, comprising peat of varying thicknesses and additional ground improvement works would be likely to be necessary.

Flood compensation measures are not considered a major issue with the Western 6 Corridor.

Given the fact that Corridor 3 is predominantly central to the existing corridor, this corridor would involve a significant impact to existing utility services.

11.9.2 Environment

The principal environmental issues associated with the development of the Western 6 Corridor would reflect those encountered by the Central Corridor (refer to Section 12) up until Logans retail facility. From this point to the northern ‘tie-in’ with the A44 (Drones Road) junction the key environmental issues for consideration would be attributed to:

- changes to the ambient noise and air quality conditions of residential properties, agricultural land holdings and sensitive ecological habitats situated along and in the vicinity of the offline section of this corridor;
- changes and modification to the local landscape character and visual prominence of the new road corridor skirting the eastern edge of the floodplain in both immediate and long distance viewpoints;
- new crossing of the Cloghmills Water which is classified as ‘Economically Significant’ under the EC Freshwater Fish Directive 78/659/EC and situated within a designated ‘nutrient sensitive area’ under the EC Urban Waste Water Treatment Directive 91/271/EC;
- alteration to the setting and appearance of Drumadoon House, a listed building, located approximately 200m to the east near Logans retail facility and any potential

unknown, buried or in-situ archaeological remains in the areas of raised bog and floodplain and fen mire;

- incursion into the 1:100 year floodplain of the River Main and loss of available flood storage capacity;
- alteration of overland drainage flows and patterns, and increased risk of pollution to local watercourses reducing water quality; and
- direct loss of raised bog and floodplain and fen mire habitats of interest to a variety of protected species and disruption to surface and groundwater flows and connections the Caldanagh and Dunloy Bogs ASSI in the north with the Frosses Bog ASSI in the south which form the Main Valley Bogs SAC, a European protected site.

11.9.3 Safety

The Western 6 Corridor dual carriageway proposal would improve traffic flow and provide a high speed transport corridor. The route improvement would remove the facility for private access onto the route, channelling all traffic turning movements to the grade separated junctions.

The highway improvement would remove the current problems of poor overtaking opportunities; vehicles forming platoons behind slow-moving vehicles; and uncontrolled traffic movements on and off the carriageway (through private accesses). Therefore the safety performance of the corridor should significantly improve in relation to the current situation.

However, similar improvements in road safety would be expected with all the corridors.

11.9.4 Economy

The estimated cost of the Western 6 Corridor is £51,590,000 (at 2005 Q1 prices). This cost-estimate includes a 22% optimism bias, but no risk allowance.

The economic performance of the corridor is as follows:

- NPV: £43,613,000
- BCR: 2.19

11.9.5 Accessibility

No assessment of accessibility has been undertaken for this stage 1 assessment.

11.9.6 Integration

This corridor would be likely to contravene the following land use and Government policies to a limited extent:

- Conserving Peatlands Statement;
- River Conservation Strategy;
- Planning Policy Statement 2 (PPS 2);
- Conservation (Natural Habitats) Regulations Northern Ireland 1995;
- Draft Northern Area Plan 2010-2016;
- Drainage (EIA) Regulations (Northern Ireland) 2001;
- The Fisheries Act 1966 as amended 2001; and
- Planning Policy Statement 15.

11.9.7 Assessment Summary Table

An assessment summary table for the Western 6 Corridor (Corridor 3) is presented in Appendix F.

12 Corridor 4 – Central

12.1 Introduction

The Central Corridor would maximise use of the existing A26 corridor and almost wholly deliver the A26 improvement through on-line improvement of the existing road.

Improvement of the existing A26 would be expected to be delivered through a combination of the improvement techniques of parallel improvement, contrained improvement and possibly off-line dualling close to the existing road, depending upon the particular constraints encountered. The 4.5km section between the Lisnasoo Road junction and the A26/ A44 (Drones Road) junction has small number of residential properties on both sides of the existing A26, and it is likely that improvement of the carriageway would affect a limited number of these properties.

The Central Corridor is presented on drawing A26-HWY-006 in Appendix A.

This chapter provides the broad assessment of the Central Corridor (Corridor 4). A full description of this corridor is provided in Section 7.4.

12.2 Engineering Assessment

12.2.1 Geometry and Departures from Standard

This corridor is essentially an on-line widening corridor. It would be proposed to route this corridor along the line of the existing A26 for the maximum distance possible, subject to adherence to design standards for a design speed of 120kph, maximising the utilisation of the existing highway corridor.

However, the existing A26 route would require significant improvement, both horizontally and vertically, to meet the current design standards for a 120kph alignment. It is considered that widening of the existing A26 would be unlikely to be delivered through a single widening technique and would likely comprise a combination of road widening techniques.

It is considered that it should be possible to design a horizontal and vertical alignment that would not require any departures from standard, but achieving design standards could lead to the route impacting upon land and residential properties outside the existing highway boundary.

A particular constraint along the existing A26 corridor is between Drumadoon House and the Logans retail facility. However, initial assessment has determined that, although tight, a dual carriageway standard road could be routed through this pinch-point.

12.2.2 Junctions

Junction improvements, or new junctions would be required on the A26 for intersections with the following side roads:

- B64 (Station Road/ Springmount Road – Glarryford crossroads);
- Lisnasoo Road;
- B93 (Killagan Road)/ B94 (Drumadoon Road); and
- A44 Drones Road.

12.2.3 Structures

Bridge numbers 10211 and 10212 which cross the River Clogh at the southern end of the scheme are considered to be outside the study area, and therefore outside the scope of this assessment.

With the exception of small culverts, the only existing bridge likely to be affected by the proposals for Corridor 4 is bridge number 30466, which carries the existing A26 over Cloghmills Water approximately 700m south of the junction with the B94 (Drumadoon Road). The existing bridge is reported to be in good condition and is understood to have sufficient loading capacity to accommodate the future traffic conditions. The structure has an existing clear span of just

under 10m, and would either need to be widened, or a parallel structure constructed to accommodate the additional carriageway.

Bridges no. 31487 and 31488 are both culvert-type underbridges that convey streams underneath the A26 approximately 100m south and 30m north of the A26/ A44 junction, respectively. Both structures comprise a clear width of 25m. This would not be considered wide enough to accommodate a full dual carriageway cross section and would be likely to require some form of widening.

For the purposes of cost-estimation, the assumed junction strategy includes for some grade separation through compact grade separated junctions (see Section 5.4). For this corridor that would result in thee new road bridges taking the side road over the new A26.

The route of this corridor would impact upon existing access arrangements for both the farming community and residential properties. In certain cases it may be appropriate to investigate the provision of alternative access arrangements which might include additional lengths of access track, relocated accesses, or even accommodation underpasses in exceptional circumstances.

12.2.4 Water Quality and Highway Drainage

The Central Corridor would seek to maximise the use of the existing A26 corridor and as a result should not directly impact upon the adjacent 1:100 year River Main floodplain.

The corridor crosses one of the major River Main tributaries, the Cloghmills Water, and it is assumed that this crossing would require a bridge structure as with the existing A26 route. In addition the route crosses five designated and five undesignated minor watercourses as well as a number of bog reens. It is possible that the majority of these minor watercourses will require culverts with fish beds and otter ledges and it should be assumed that all bog reens will at least have to be culverted.

It is anticipated that the highway surface water run-off will generally be discharged into these adjacent River Main tributaries and associated watercourses. These outfalls would require pollution control provision as well as, almost certainly, attenuation facilities. An attenuation pond would require excavations at least 1.0 m below the outfall level and in certain locations this could lead to problems with ground water.

It should be noted that there are two low points on the existing A26 route where the only possible discharge points are directly into the Frosses bog. If these discharge points are maintained in the new scheme, the treatment requirements for the highway surface water run-off at these points are likely to be more onerous and expensive than the standard petrol interceptor provision.

Emergency spillage ponds may also be required at the four proposed junctions for this corridor depending on traffic flows. These normally have a capacity of 50 cubic metres and are sited at the associated outfall. The construction of the spillage ponds at all four junction outfalls could encounter ground water problems although this is not thought to be a significant risk at the proposed Lisnasoo Road Junction.

It should also be noted that on sections of the existing road, between the proposed junctions with the B93 (Killagan Road) and Lisnasoo Road, there appears to be a spring line which may require additional drainage measures.

The surface water drainage strategy for the scheme would need to be agreed with the Rivers Agency and the Environment and Heritage Service and this would be undertaken during the stage 2 assessment.

12.2.5 Public/ Private Utility Services

The majority of the existing public and private services known to be present within the study area appear to be limited to the existing A26 route corridor and the adjacent B93 (Killagan Road) and Old Frosses Road corridors.

The Central Corridor utilises the existing A26 corridor for the majority of its length and as a result, the following existing services will potentially be affected:

- for the majority of its length, the corridor proposes on-line widening of the existing A26 which carries longitudinal BT underground fibre-optic cables along its whole length and a Water Service water main from the point just north of the proposed Lisnasoo Road junction to the tie-in at the proposed junction with the A44 (Drones Road); and
- the Central Corridor also intersects a Water Service water main, four 33kV overhead NIE cables, six 11kV overhead NIE cables and seven MV overhead NIE cables.

The level of impact on these existing utility services and the associated diversion requirements will be assessed and confirmed during the stage 2 assessment. An allowance has been included within the cost estimate for this corridor for utility service diversion.

12.2.6 Geotechnical Issues

Corridor 4 would closely follow the existing A26 corridor, along the eastern edge of the River Main valley bottom. However, as this margin is irregular, certain sections of the corridor would almost certainly be onto the peaty and alluvial material of the valley bottom.

The initial section for 1.3km north of Glarryford is generally underlain by glacial till, but includes a minor valley 0.5km north of Glarryford, where poor ground conditions comprising alluvial and peaty soils are likely to be present. There is an existing petrol filling station on the eastern side of the existing A26 in this section. This is potentially a source of contaminated land.

In the vicinity of the Frosses Trees the corridor would cross the eastern edge of a poorly drained and peaty area that includes the eastern edge (and undesignated section) of the Frosses Bog. These low lying areas would probably require a road to be on embankment, with the probable removal or treatment of the alluvial and peaty deposits beneath.

Between the two Frosses sections a drumlin hill is present, which would require a cutting into glacial till material.

North of the Frosses section, the geology encountered by this corridor is glacial till and drumlin terrain. Minor cutting into glacial till material may be required.

Where the A26 descends towards the Cloghmills Water valley, there is high groundwater, with numerous springs. Locally poor alluvial and peaty ground conditions are likely to be present, which will probably require removal or treatment below the shallow embankment that will probably be required for this section. On the existing A26 in this section there is a petrol filling station which is potentially the source of contaminated land.

Past the Cloghmills Water valley the geology of the corridor would return to glacial till, which would continue to the junction with the B94 (Drumadoon Road).

North of the B94 (Drumadoon Road) junction, the final section of this corridor continues to follow the existing A26 route. The existing route sits on slightly elevated, better drained land which comprises a mixture of alluvial deposits and peaty soils, although this material may be thin in places. Road construction through this section would likely require a degree of removal of unsuitable material, or ground stabilisation.

12.2.7 Impact Upon Buildings and Property

Corridor 4 would be expected to have the largest impact upon residential properties or other buildings within the study area.

The basis of this corridor is improvement, and as the existing A26 has a number of residential properties and other buildings close to the existing road, there will be some impact upon these premises. However, more detailed assessment at Stage 2 would be required to better assess the potential impact upon these properties. In addition, subject to confirmation of land ownership boundaries, some impact to land associated with other buildings may result.

12.2.8 Construction issues

Existing ground conditions indicate that widening of the existing A26 would be likely to encounter poor ground, which would require either ground improvement works, or removal of the material from site. This would increase the amount of required import material.

12.2.8 Construction issues

Existing ground conditions indicate that widening of the existing A26 would be likely to encounter poor ground, which would require either ground improvement works, or removal of the material from site. This would increase the amount of required import material.

Possible sourcing of fill material has not been considered at this stage of assessment.

The existing structures along the route would either need widening or improving, and it may even be considered appropriate to replace structures depending upon their condition.

Traffic management would be a major constraint for this corridor. With the alignment being almost wholly on-line widening of the existing road, it is likely that significant traffic management would be required for the duration of the construction project, and potentially this could increase the length of the construction project in relation to the other corridors.

12.3 Traffic Assessment

12.3.1 Introduction

The transport impact of this corridor has been assessed on a preliminary basis. At this coarse stage of assessment, there is little difference between any of the corridors assessed with respect to traffic movements

12.3.2 Traffic Flow Changes

An estimate of road network flows for this corridor has been made. Detailed alignment and junction layouts have not yet been determined, the forecast flows, at this stage, for an improved A26 are therefore broad estimations, and assume that virtually all existing A26 traffic would transfer onto the new A26 dual carriageway for at least part of their journey.

For this Stage 1 assessment it has been assumed that flow patterns on side roads would remain as with the present case.

Table 12.1 shows the broadly estimated flows on each road link for 2012, the notional year of opening, and for 2027, the design year, with the new A26 improvement in place.

The results of this early traffic assessment are presented graphically in figure 12.1 (overleaf).

It should be noted that the flows given in table 12.1 are preliminary estimates. Origin-destination data was unavailable at the time of this study, and thus detailed estimating of re-routing of traffic was not possible. It is expected that this work should be undertaken at stage 2 should this corridor be progressed.

Figure 12.1: Traffic Flows Central Corridor

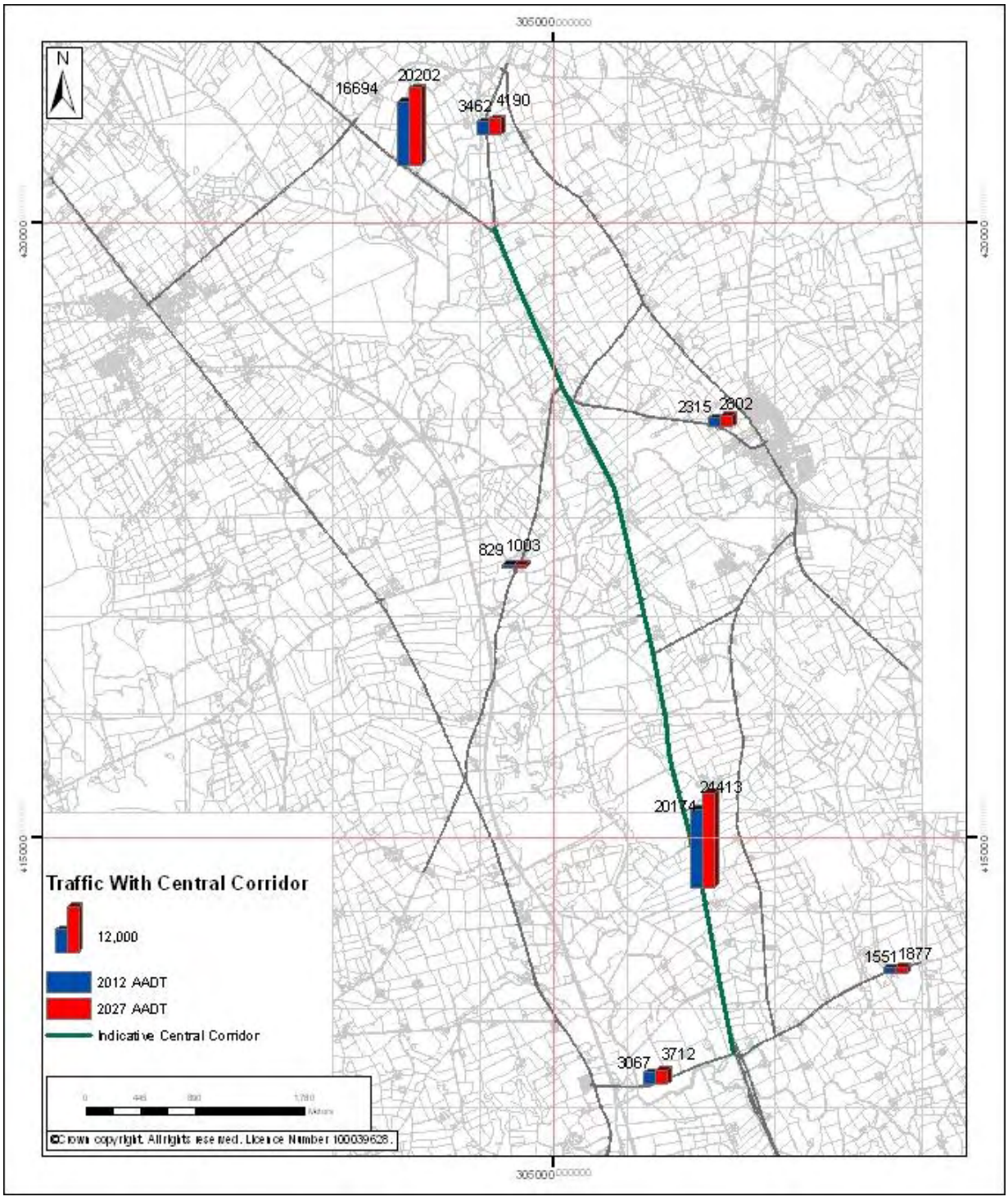


Table 12.1: Estimated Forecast Flows with A26 Improvement in place

Road	Direction of Flow	2012 Year of Opening AADT	2027 AADT
New A26 Improvement, north of B64	**northbound**	**10,051**	**12,163**
	southbound	**10,123**	**12,250**
B64 (Station Road), west of A26	*eastbound*	1,524	1,844
	westbound	1,543	1,868
B64 (Springmount Road) east of A26	*eastbound*	778	942
	westbound	773	935
Lisnasoo Road	*eastbound*	1,076	1,303
	westbound	1,033	1,250
B93 (Killagan Road), west of A26	*northbound*	397	480
	southbound	432	523
B94 (Drumadoon Road), east of A26	*eastbound*	1,184	1,433
	westbound	1,131	1,369
A44 (Drones Road), north of A26	*northbound*	1,679	2,032
	southbound	1,783	2,158

12.4 Environment Objective

12.4.1 Introduction

The potential environmental impacts associated with the development of the Central Corridor are described in this section.

12.4.2 Noise

A ribbon pattern of development characterizes the distribution of residential dwellings along the existing A26. However, with the exception of one residence located in the vicinity of the B64 (Springmount Road and Station Road - Glarryford Crossroads), there are no other residences located along the northbound carriageway until approximately 500m north of the Frosses Trees. All of these residential and farming properties have direct road access and frontage with the existing A26.

Overall, it is estimated that approximately 68 residences are located within 300m of the Central Corridor, as follows:

- Within 50m – 22 residential dwellings;
- 51m to 100m – 11 residential dwellings;
- 101m to 150m – 12 residential dwellings;
- 151 to 200m – 10 residential dwellings;
- 201m to 250m – 7 residential dwellings; and
- 251m to 300m – 6 residential dwellings.

A non-residential receptors that could be potentially affected by the construction and operation of the Central Corridor is Drumadoon House, a listed building, located immediately adjacent to the southbound carriageway of the A26 at its junction with the B94 (Springmount Road and Station Road).

Ambient noise levels along the existing A26 are dominated by road traffic. The proposed widening of the existing A26 to develop a Central Corridor would result in an overall net increase to the physical footprint of the road. Consequently, the distance between the nearest residential properties (sensitive receptor) straddling both sides of the existing A26 and the widened road (noise source) would potentially reduce (depending upon widening strategy) as the new road corridor is brought closer to these properties. This could potentially increase the

levels of road traffic noise currently experienced by these residential properties (without mitigation) leading to a gradual deterioration of the local amenity over the design life of the new road.

The A26 is currently one of Northern Ireland's major 'north-south' traffic routes and caters for large traffic volumes during daily peak and holiday periods. The development of a corridor more central to the existing route between the B64 (Springmount Road and Station Road) and the A44 (Drones Road) junction would gradually, over time, cater for larger volumes of road traffic. This would lead to a potential discernible increase in road traffic noise (i.e. greater than 3 dBA change in background levels), particularly on the facades of the nearest residential dwellings situated on both sides of the widened road corridor. At this stage it is too early to determine whether increased road traffic noise levels would exceed the 68 dBLA10, 18hr level qualifying properties for noise insulation under the *Noise Insulation Regulations 1975 (as amended 1988)*. It is proposed to undertake detailed noise modeling and further assessment work as part of the stage 2 assessment studies. A package of appropriate noise attenuation measures would need to be developed (i.e. noise walls, landscaped bunds or low noise pavements) to minimize the potential for road traffic noise impacts on the nearest residential properties to the proposed Central Corridor.

Sensitive ecological receptors such as the Frosses Bog ASSI (also forms part of the European designated Main Valley Bogs SAC) and Frosses North SLNCI, are located immediately adjacent the northbound carriageway of the existing A26. These could be directly and indirectly affected by both road construction and increases in road traffic noise. Further investigations on such issues will be undertaken as part of the stage 2 assessment work, as appropriate.

Drawing number A26-ENV-011 (Appendix D) shows the distribution of noise sensitive receptors within 300m of the Central Corridor.

12.4.3 Local Air Quality

There are approximately 55 residential dwellings located within 200m of the Central Corridor which could be exposed to temporary episodes of construction dust and increased levels of vehicle emissions (i.e. from both stationary and flowing traffic) during operation as follows:

- Within 50m – 22 residential dwellings;
- 51m to 100m – 11 residential dwellings;
- 101m to 150m – 12 residential dwellings; and
- 151m to 200m – 10 residential dwellings.

Local air quality, particularly for the nearest residential properties straddling both sides of the A26 would be dominated by the exhaust emissions of motor vehicles. Vehicle exhausts emit the following air pollutants of concern: PM_{10}, NO_2, CO, benzene and 1, 3 butadiene, which are identified as being of most concern by the UK Government's Air Quality Strategy (AQS) and relevant European and UK legislation. The development of a corridor more central to the existing route would change the baseline ambient air quality and air pollutant concentration levels currently experienced by the nearest residential properties situated on both sides of the A26. It would also change air quality experienced by the sensitive ecological habitats located within the Frosses Bog ASSI (also forms part of the European designated Main Valley Bogs SAC) and the Frosses North SLNCI (and associated areas of raised bog and floodplain and fen mire) which are located directly adjacent to the northbound carriageway of the existing A26.

The extent to which local air quality will change during the operation of a Central Corridor would be dependent on the future traffic volumes travelling along the new corridor, the composition of this traffic, particularly in terms of the proportion of HGVs in the overall flows, and vehicle speeds. Nevertheless, it is considered that the widened corridor would provide a higher quality road traffic environment through better road pavement surfaces and free-flowing driving conditions, and reduced levels and periods of traffic congestion currently experienced on the existing A26. Such improvements to the existing road traffic environment could enhance the local air quality of the nearest residential properties along this corridor despite the widened road

being closer, in places. In particular, these improvements could result in beneficial impacts on local air quality as existing 'stop-start' conditions encountered during times of congestion could be alleviated by the proposed road improvement scheme. Further investigations will be undertaken as part of the stage 2 assessment work to better understand the potential impacts or benefits associated with the development of new online corridor and to identify appropriate measures to mitigate any potential impacts on local air quality, as appropriate.

Furthermore, other sensitive receptors such as ecological communities and habitats of interest to protected fauna species, particularly to the west of the existing A26 could also be adversely affected by fugitive dust outbreaks and entrainment during road construction and increased levels of vehicle exhausts emitted by traffic during operation which could settle out onto these areas.

Appropriate mitigation measures will be identified in order to minimise the impact of the scheme on local air quality during scheme construction. A package of dust suppression and traffic management measures will be developed in consultation with the Local Authority EHOs and DoE – EHS and in accordance with the Code of Construction (CoCP). Operational mitigation measures for this scheme proposal would be developed in more detail during the Stage 2 and 3 scheme assessment process.

Drawing number A26-ENV-012 (Appendix D) shows the distribution of sensitive air quality receptors within 200m of the Central Corridor.

12.4.4 Greenhouse Gases

At this stage it is too early to determine the levels and significance of greenhouse gas emissions directly attributed to the development of a new Central Corridor. It is acknowledged, however, that the emissions of greenhouse gases such as CO_2 could potentially change as a result of the development of a corridor more central to the existing route and new advancements in vehicle design and cleaner fuel technologies. The quantum of change to the generation of existing greenhouse gases currently emitted into the local airshed would primarily be attributed to the improved conditions of the new road traffic environment and volume of future traffic flows.

Emissions of greenhouse gases from the road transport sector are expected to rise in the UK as a whole, as growth in road traffic outweighs benefits from adoption of cleaner technology. Subsequently, further investigation into the potential contributions of road traffic travelling on the Central Corridor to climate change as a result of potential increased greenhouse emissions (i.e. CO_2) would be undertaken during the next stages of road design and development.

12.4.5 Landscape

The existing A26 passes through the study area along a predominantly north-south axis, and is a busy and dominant built feature in the local landscape. Its current alignment is intermittently concealed and integrated into the landscape by intervening topography, existing roadside development and vegetation. The development of a new Central Corridor would aim to optimise the use of the existing alignment and road infrastructure, as far as reasonably practicable, in order to reduce the extent of modification and change to the local landscape fabric and level of visual intrusion to local residents and sensitive viewpoints within and surrounding the study area.

The development of a new Central Corridor would utilise the existing A26 for the majority of its length to limit the amount of land to be acquired from adjacent properties for widening and overall physical footprint of the new, widened road corridor. On-line widening would involve the reprofiling of land along the corridor to accommodate the new pavement areas and drainage systems and require the removal of vegetation (i.e. low-level shrubs and trees) from existing road verges and transitional areas along the A26. Furthermore, on-line widening, depending upon the form of widening adopted, could result in the removal of Scots Pines from the two sections of Frosses Trees (an important local landscape feature of significance), possible realignment of local property accesses and driveways and loss of private gardens of the nearest residential properties due to 'strip' acquisition. Along certain parts of the new online

corridor and according to local ground conditions and terrain profiles, retaining wall structures and additional drainage culverts (i.e. the Cloghmills Water crossing) may need to be installed. These widening proposals would increase the level of visual intrusion currently experienced by the nearest residential properties along the A26.

The historic setting of Drumadoon House, a listed building, situated immediately adjacent to the southbound carriageway of the A26 at its junction with the B94 (Drumadoon Road) could be impacted upon by the development of new Central Corridor and, depending upon widening methodology, could involve widening the road at this point and acquiring a potential strip of land from this property. The appearance of this listed historic feature in the local landscape could therefore be adversely affected.

Material changes in land use would largely be associated with the direct loss of good quality agricultural land which is largely improved grassland used for cattle grazing.

An effective urban design and landscaping strategy would be developed to soften and where possible alleviate potentially adverse effects associated with localised changes and modifications to the local landscape character and visual setting within the study area, particularly for the residents of the nearest properties to likely to be most affected by the widening proposals.

At this stage it is too early to determine exactly how prominent the on-line widening proposals would be in longer views, particularly from elevated ground flanking both the eastern and western parts of the floodplain. However, it is considered that there are significant opportunities to effectively integrate the new road corridor into the existing landscape through a combination of subtle and structured landscaping to the extent that beneficial impacts could arise. Further investigations into the potential landscape and visual impacts of a new online corridor will be undertaken during the next stages of road design and development.

A landscape strategy incorporating a package of mitigation measures and design treatments would be developed to integrate this corridor into the existing landscape fabic as effectively as possible. The strategy would consider proposals for earth shaping and re-contouring, vegetation screens and barriers, drainage design, reinstatement of severed hedgerows and vegetation blocks and planting measure. A key focus of the landscape mitigation would be the approaches to and crossing of watercourses. Such measures would be developed as part of the Stage 2 Scheme Assessment work.

It is considered that there are significant opportunities to effectively integrate the new road corridor into the existing landscape through a combination of subtle and structured landscaping to the extent that beneficial impacts could arise. Further investigations into the potential landscape and visual impacts of a new online corridor will be undertaken during the next stages of road design and development.

12.4.6 Biodiversity

The majority of land directly adjacent to the existing A26 is improved grassland, however, the Frosses Bog ASSI (also forms part of the European designated Main Valley Bogs SAC), the Frosses North SLNCI, and associated areas of raised bog and floodplain and fen mire straddle the existing A26 on both sides between the B64 (Glarrford Crossroads and the North Frosses Trees) are located directly adjacent to the northbound carriageway of the existing A26. These areas support habitats of interest to a variety of fauna species (i.e. small mammals, invertebrates, reptiles, amphibians, birds) for nesting, breeding and refuge. Some of these species are also likely to be listed as protected species under the EC Habitats Directive 79/43/EC and the *Wildlife (Northern Ireland) Order 1985*.

Development of this corridor would involve ground disturbance and earthworks directly adjacent to these areas which could adversely affect their ecological integrity, albeit on a temporary basis during construction, due to noise, dust outbreaks and entrainment of vegetation communities, sedimentation from surface water runoff and light emissions. Such effects could impact on the “feature interests” of the Frosses Bog ASSI (Main Valley Bogs SAC designated under the *EC Habitats Directive 92/43/EC*) and, as such, in consultation with the DOE – EHS

(Natural Heritage), the development of a Central Corridor would be subject to an Article 6 Assessment process (i.e. appropriate assessment) to determine whether a new online corridor would impact the integrity of the habitats of the Frosses Bog ASSI and Main Valley Bogs SAC.

The results of wintering surveys undertaken between November 2006 and February 2007 confirmed the presence of badger activity and setts on both sides of the existing A26. These were located immediately to the south of the Frosses Bog ASSI and badger crossing points were identified between the Lisnasoo Road junction and Cloghmills Water. Furthermore, these surveys also indicated the presence of protected wintering bird species listed under Schedule 1 of the *Wildlife (Northern Ireland) Order 1985,* namely fieldfare and redwing on both sides of the existing A26. It is likely that mature trees and buildings in the immediate vicinity of the existing A26 could be of interest to a variety of bat species and raptors such as the barn owl which are fully protected under the *Wildlife (Northern Ireland) Order 1985.* Certain mature trees could also be subject to tree preservation orders.

On-line widening would avoid any direct habitat loss and incursions into the Frosses Bog ASSI and Frosses North SLNCI. However, associated areas of raised bog, floodplain and fen mire habitats would be removed. The extent of such vegetation and habitat removal would be significantly less than any of the off-line corridors to the east and west of the existing A26 under consideration.

Overall, the principal impacts associated with the development of a corridor more central to the existing route would be attributed to the direct loss and disturbance of habitats, and indirect polluting effects of road runoff and drainage. It is envisaged that this corridor would result in minor alterations to the existing natural drainage regime and require the provision of additional drainage works and waterway openings to avoid any potential obstructions to the passage of floodwaters.

A series of ecological mitigation measures would be developed to following the completion of targeted species surveys and as part of the Stage 2 Scheme Assessment work. These measures may include but not be limited to the installation of fauna-proof fencing to prevent wildlife from directly entering the roadway, fauna underpasses to maintain wildlife connectivity and movements across the roadway, re-routing the road to minimise or avoid the direct loss and/or severance of sensitive habitats, pre-construction closure and relocation of fauna populations (i.e. known badger setts), provision of compensatory habitats and offsets.

12.4.7 Heritage of Historic Resources

The local archaeological and heritage resource along the existing A26 has more than likely been destroyed, or severely truncated, by previous construction and development activities. However, the potential does exist for certain types of fragile archaeological remains destroyed or partially destroyed during previous and current development activities to be scattered in areas of boggy or waterlogged ground that, in part, is situated directly adjacent to the existing A26. Such remains would be susceptible to further physical damage and potential destruction during road construction activities, particularly earthworks.

There is one listed building, Drumaddon House, which is located directly adjacent to the southbound carriageway of the existing A26 and its junction with the B94 (Drumadoon Road). The setting and appearance of this building could be affected through a widened road footprint.

The development of the Central Corridor would require:

- comprehensive surface archaeological survey;
- potential subsurface testing and surveys programmes in areas identified as likely to be of high archaeological potential;
- erection of protective fencing and other appropriate measures around any areas of potential 'archaeological sensitivity';

- implementation of an archaeological watching brief by a suitably qualified archaeologist to ensure that any unknown archaeological remains or deposits identified during road construction can be recorded; and
- possible salvage excavations, or other appropriate rescue-record measures, for the in-situ conservation of archaeological remains.

Such mitigation measures would be necessary in those areas involving significant excavation and ground penetration works, e.g. in proximity to watercourse crossings which will require the construction of bridge structures, and the installation of water quality control and road drainage systems.

12.4.8 Water Environment

The Central Corridor would traverse approximately 0.4 km of land situated within the 1:100 year flood extent of the River Main and its associated tributaries. It is estimated that approximately 2.45 ha of land within the 1:100 year flood extent would be directly lost to the development of this Central Corridor which is unlikely to result in significant reduction in available flood storage capacity within this section of the River Main catchment.

The lateral extent of the 1:100 year flood event within the study area is shown on Drawing number A26-ENV-002 (refer to Appendix D).

There are likely to be up to three crossings of minor watercourses and numerous crossings of unnamed drainage lines required for the development of the Central Corridor as follows:

- one crossing of the River Clogh at the southern part of the study area;
- one crossing of the Cloghmills Water approximately 500m to the south of the A26/ B94 (Drumadoon Road) junction;
- one crossing of the Killagan Water on approach to the northern 'tie-in' point; and
- numerous crossings of unnamed and natural drainage lines flowing in an east-west direction to the River Main.

The principal environmental hazards associated with the development of the Central Corridor on the local water environment are:

- increased velocity and volume of road runoff associated with the provision of additional hard, impervious road pavement surfaces along the existing A26 alignment leading to channel and bank erosion and scouring of local watercourses flowing into the River Main;
- minor alteration of natural drainage patterns and overland flow regimes due to the introduction of new road infrastructure;
- minor increase in flood risk due to the direct displacement of flood storage capacity from the introduction of new, permanent physical obstructions in watercourses (i.e. transverse drainage culverts and bridge structures) and floodplains (i.e. road embankments) artificially concentrating stormwater flows and impeding the movement of floodwaters throughout this part of the catchment, particularly in the vicinity of the Cloghmills Water;
- increased levels of afflux both upstream and downstream within the Cloghmills Water due to the upgrading and provision of new drainage culverts;
- pollution of watercourses from road runoff (i.e. influx of concrete washings, sediment laden and nutrient enriched runoff from disturbed and exposed areas during construction and or dissolved or particulate pollutants such as heavy metals and toxic compounds, floating solids (litter, road surface wear and grit), fuel oils and chemicals, and other materials in suspension during operation. Surface waters and features at the greatest risk will be those situated closest to the potential pollution source, especially where construction activities are proposed to take place adjacent to the Frosse Bog ASSI and Frosses North SLNCI, and at the crossing of the Cloghmills Water; and

- accidental spillages of chemicals, fuel oils and other toxic products during road construction works and motor vehicle accidents during operation which could impact on local water quality and the ecosystem health of the Frosses Bog ASSI and associated habitat areas.

A number of soil and water management measures and water quality control systems would be required to mitigate any potential water quality impacts during both construction and operation of the Central Corridor. This may include, but would not be limited to the use of sustainable drainage systems (i.e. swales, filter drains, balancing ponds and ditches), petrol interceptors, water quality control ponds, soakways and careful drainage design. The drainage designs for this corridor would be developed in more detail as part of the Stage 2 Scheme Assessment work.

12.4.9 Physical Fitness

It is unlikely that the development of a new Central Corridor would incorporate pedestrian footpaths and cycle-ways into the overall dual carriageway road design. Furthermore, the overall physical footprint and speed environment of the new dual carriageway would increase resulting in additional traffic lanes with vehicles traveling at a more consistent higher speed would need to be crossed by pedestrians and cyclists which would present a major safety issue. In view of this, further investigations would be undertaken to identify opportunities to incorporate facilities or measures for pedestrians and cyclists along the proposed Central Corridor so as to not compromise safety standards or contribute to any unnecessary community severance at stage 2.

12.4.10 Journey Ambiance

The Central Corridor would be designed to meet requisite standards for a rural dual carriageway which would significantly improve the existing road traffic environment through the provision of additional road capacity, new and higher travel speed, new and better quality road pavement surfaces. These factors would contribute to improving road safety, reducing the levels and periods of traffic congestion, particularly during peak daily travel and holiday periods, reduce travel times and enhance north-south connections within Northern Ireland.

Overall, this would assist to lessen current levels of diver stress and anxiety.

The route improvement proposals should lead to improvements in road safety, but would compromise the level of direct access provision currently experienced by the local community.

The net result is that there would be a significant improvement to the overall journey ambience experienced by all road users traveling along an online corridor. Furthermore, it would be reasonable to conclude that there would a reduction in overall accident rates and the type of accidents (i.e. shunt type accidents from the rear caused by vehicles wishing to overtake traffic).

12.5 Safety Objective

12.5.1 Accidents

It is likely that improving the existing S2 carriageway to a D2AP carriageway will improve the safety performance of the A26. Presently, largely because of the congested nature of the route, and the lack of safe overtaking opportunities, shunt-type accidents are common. Improving the design standard of the route and the capacity is likely to lead to the A26 becoming a much safer high-speed transport corridor.

It is considered that this corridor would be likely to reduce the potential for accidents associated with the following:

- Pedestrians. There are a number of residential properties along the line of the existing A26, and given the high speed nature of the proposed route, pedestrian usage along the proposed improved A26 corridor would be likely to be restricted. Therefore, the potential for pedestrian and vehicle conflict would be greatly reduced in relation to the current situation. However, one area of concern exists around the B94 (Drumadoon Road) and B93 (Killagan Road) junctions. The Logans retail facility and Drumadoon

House tea room could potentially create a pedestrian desire line between these two facilities. Should this corridor be progressed to the next stage, this issue will be considered further; and

- Vehicles using private direct accesses off the main road. The standard of the improved A26 highway would not permit direct private access onto the main carriageway. Access would be routed via the proposed key junctions. This will create a safer environment for vehicles entering and leaving the route.

Given the early stage of design for this study, it has not been possible to undertake a quantitative analysis to determine accident rates for the proposed route. However, the above qualitative assessment suggests accident rates for the road should reduce significantly as a result of this corridor being implemented.

12.5.2 Security

Given the rural nature of the A26 study area, security is unlikely to be a factor in deciding upon corridor preference. Therefore no assessment of security has been undertaken at this stage of assessment.

12.6 Economy Objective

12.6.1 Cost-Estimate

The cost- estimate for the Central Corridor has been based on the following information:

- 1.0 km of off-line dual carriageway;
- 6.0 km of dual carriageway based along the existing route;
- 2.2 km of access roads to dwellings;
- 0.7 km of feeder roads;
- 3 overbridges;
- 2 river crossings;
- 2 nr roundabouts; and
- Piled foundations through 1.1 km of peat bog. (An alternative estimate, based on excavation of the peat material in lieu of piling, was also assessed, but this construction method was assessed to be a higher cost, therefore a piling solution has been included in this stage 1 cost-estimate. This, however, will be reviewed during the stage 2 assessment).

The following earthworks quantities have been estimated and priced:

- Earthworks cut volume 250,038 m^3;
- Earthworks fill volume 513,089 m^3; and
- Topsoil volume 79,563 m^3.

Given the early stage in the design process for this assessment, it was necessary to make a number of assumptions to develop a stage 1 cost estimate. These assumptions are listed below:

- agricultural land quality is relatively poor to the west of the existing A26 and land cost has therefore been assumed as £10,000 per acre (as advised by VLA);
- given the relatively poor land quality to the west of the A26, farm or property severance is likely to be limited. Compensation costs have been assumed at 10% of the scheme cost;
- All roads require temporary fencing;
- All roads require boundary fencing;

- Safety barrier allowed for the full length of the central reserve and an allowance at junctions;
- All cut material is to be reused on site;
- Raised rib edge line both sides; and
- 475 mm thick road construction.

The total estimated cost of this corridor, including a 22% optimism bias (see Section 8.4.2) is **£48,669,000**. A summary of the cost-estimate is provided in Table 12.2 (overleaf).

Table 12.2: Cost-Estimate for Central Corridor

Cost Item	Cost (£) - 2006 Q4	% of cost
Preliminaries	£ 4,800,906.49	11.36%
Site Clearance	£ 97,658.27	0.23%
Fencing & env. barriers	£ 387,787.50	0.92%
Safety fences	£ 687,464.17	1.63%
Drainage	£ 2,242,346.34	5.31%
Earthworks	£ 9,173,242.62	21.70%
Pavements	£ 6,899,367.40	16.32%
Kerbs & footpaths	£ 454,758.31	1.08%
Traffic signs & markings	£ 418,447.53	0.99%
Street lighting	£ 370,338.86	0.88%
Electrical works	£ 15,051.85	0.04%
Landscaping	£ 570,401.99	1.35%
Overbridges	£ 1,500,000.00	3.55%
River crossings	£ 400,000.00	0.95%
Accommodation works	£ 931,207.15	2.20%
Statutory bodies	£ 1,108,377.11	2.62%
Sub total	**£ 30,057,355.59**	71.11%
Contractor's O&P @ 10%	£ 3,005,735.56	7.11%
Sub total	**£ 33,063,091.15**	78.22%
Land costs	£ 707,821.88	1.67%
Compensation costs	£ 3,306,309.11	7.82%
Sub total	**£ 37,077,222.15**	87.72%
Preparation (9%)	£ 3,336,949.99	7.89%
Supervision (5%)	£ 1,853,861.11	4.39%
Sub total	**£ 42,268,033.25**	100.00%
Optimism Bias (22%)	£ 9,298,967.31	22.00%
TOTAL ESTIMATED COST (2006 Q4)	**£ 51,567,000.56**	
TOTAL ESTIMATED COST (2005 Q1 @ - 5.62%)	**£ 48,668,935.13**	

12.6.2 Risk

A risk assessment was carried out for this corridor. The methodology adopted is presented in section 8.4.2.

An early risk register was developed for this assessment. The full risk register can be found in Appendix E.

The following is a summary of what are considered to be the most significant risks to this corridor:

- scheme costs could exceed the budget. This could be as a result of initial under-estimation or error, or unexpectedly high construction inflation. This could result in the need for additional scheme funding to be sourced or potentially the scheme being suspended in favour of other, cheaper schemes;
- environmental risks exist for this corridor. The corridor would improve the existing A26 route past the Frosses Trees, and therefore would pass close to the Frosses Bog ASSI, and the potential for edge effects would exist;

- geotechnical risks exist for this corridor. The ground conditions along the route are known to comprise some areas of poorly drained peat of variable thickness. The exact extent of the unsuitable material is not known at this stage;
- this corridor would almost wholly be considered to be on-line widening. There are major cost and programme risks associated with the significant traffic management required for on-line works; and
- this corridor has the potential to affect a number of residential properties. Property prices could increase beyond inflation, affecting the cost for the corridor.

12.6.3 Public Accounts

Based upon a coarse assessment of impact to public accounts, Table 12.3 summarises the public accounts for the Central Corridor. An explanation of the composition of the table is provided in section 8.4.4.

Table 12.3: Public Accounts Table for Central Corridor

	All Modes Total	**Road**	**Bus**
Local Government Funding			
Revenue	0	0	0
Operating Costs	0	0	0
Investment Costs	0	0	0
Developer & Other Contributions	0	0	0
Grant/ Subsidy Payments	0	0	0
NET IMPACT	**0**	0	0
Central Government Funding			
Revenue	0	0	0
Operating Costs	2,942	2,942	0
Investment Costs	34,038	34,038	0
Developer & Other Contributions	0	0	0
Grant/ Subsidy Payments	0	0	0
Indirect Tax Revenue	-2,200	-2,200	0
NET IMPACT	**34,780**	34,780	0
TOTAL Present Value of Costs (PVC)	**34,780**		

12.6.4 Transport Economic Efficiency

A summary of the coarse transport economic efficiency assessment is provided overleaf in Table 12.4 (overleaf).

Table 12.4: Economic Efficiency of the Transport System (TEE) for the Central Corridor

	All Modes Total	**Road**		**Bus**
Consumers				
User Benefits (£000s)				
Personal Travel				
Travel Time	36,330	36,330		0
Vehicle Operating Costs	-1,157	-1,157		0
User Charges	0	0		0
During Construction & Maintenance	-2,712	-2,712		0
NET CONSUMER BENEFITS	**32,461**	32,461		0
Business				
User Benefits		Personal	Freight	Passengers
Travel Time	57,245	41,911	15,334	0
Vehicle Operating Costs	-791	693	-1,484	0
User Charges	0	0	0	0
During Construction & Maintenance	-5,568	-3,960	-1,608	0
Sub Total	**50,886**	38,644	12,242	0
Private Sector Provider Impacts				
Revenue	0			0
Operating Costs	0			0
Investment Costs	0			0
Grant/ Subsidy	0			0
Sub Total	0			0
Other Business Impacts				
Developer Contributions	0	0		0
NET BUSINESS IMPACTS	**50,886**			
TOTAL (£000)				
Present Value of Transport Economic Efficiency Benefits	**83,347**			

Table 12.5 provides an overall summary of the economic performance of the Central Corridor.

Table 12.5: Summary of Monetised Costs and Benefits for Central Corridor

Cost or Benefit	Sum (£000)	Comments
Consumer User Benefits	32,461	
Business User benefits	50,886	
Private sector Provider Impacts	0	
Other Business Impacts	0	
Accident Benefits	0	
Carbon Benefits	-321	
Present Value of Benefits (PVB)	**83,026**	
Local Government Funding	0	
Central Government Funding	34,780	
Present Value of Costs (PVC)	**34,780**	
Overall Impacts		
Net Present Value (NPV)	**48,246**	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	**2.387**	BCR=PVB/PVC

An explanation of the composition of tables 12.4 and 12.5 is provided in section 8.4.5.

It can be seen from Table 12.5 that the results of the coarse economic assessment would indicate that the Central Corridor would be likely to deliver a positive benefit to cost ratio (BCR) of 2.39, with a net present value (NPV) of over £48million.

However, these results should be read in conjunction with the assumptions and limitations listed in Section 8.4.5.

12.6.5 Reliability

Reliability has not been assessed for this stage 1 assessment, as discussed in section 8.4.3.

12.6.6 Wider Economic Impacts

The wider economic impacts objective has not been assessed for this stage 1 assessment. See section 8.5 for details.

12.7 Accessibility Objective

The accessibility objective has not been assessed for this stage 1 assessment. See section 8.5 for details.

12.8 Integration Objective

12.8.1 Transport Interchange

The transport interchange sub-objective has not been assessed for this stage 1 assessment. See section 8.6.1 for details.

12.8.2 Land Use Policy

The following land use policies would impact on Corridor 4:

- Conserving Peatlands Statement – The Government has produced a policy statement on conserving peatlands in Northern Ireland. The policy is currently under review; however, the emerging policy is likely to have a greater emphasis on maintaining, enhancing and restoring peatland habitat, particularly for lowland raised bog, blanket bog and fen habitats. Proposed new elements of the policy also refer to maintaining and restoring the role of peatland in maintaining the hydrological integrity of the river basins. Therefore, any development on or adjacent to peatland habitats is likely to be in opposition with the objectives of a new and revised peatlands policy statement. This corridor is almost wholly on-line widening of the existing route, so the potential impact to existing peatlands would be limited. It is therefore considered that this corridor would not significantly contravene the peatlands policy; and
- River Conservation Strategy – This corridor could have a minor impact on the River Main, its tributaries, and its floodplain, and therefore would not comply with the objectives of the river conservation strategy, to maintain and enhance the ecological integrity and biodiversity of rivers. However, the majority of this corridor would seek to utilise the existing road corridor, so the extent to which the policy would be contravened would be limited.

12.8.3 Other Government Policies

The other Government policies that would also affect this corridor are listed as follows:

- *Planning Policy Statement 2 (PPS 2)* – There is the potential that this corridor could, in some way, have some impact upon the Main Valley Bogs SAC, the Frosses Bog ASSI and the Killycreen & Frosses North SLNCI. However, any potential impact to these designated sites is likely to be marginal, and therefore it therefore considered minor;
- *Conservation (Natural Habitats) Regulations Northern Ireland 1995* – Because of the proximity to the SAC/ASSI's, this corridor would be closely investigated by EHS under the *Conservation of Natural Habitats & Wild Flora & Fauna Directive (92/43/EEC)* as transposed by the *Conservation (Natural Habitats) Regulations Northern Ireland 1995*. This corridor would be subject to an appropriate assessment under Part 6 of these regulations. The regulations state that only in the case of there being no alternative solutions and the scheme being carried out for imperative reasons of overriding public interest (which may be of a social or economic nature), would the competent authority agree to the scheme notwithstanding a negative assessment of the implications for the site. It is not considered this corridor would significantly impact upon these features, if at all, and therefore potential impact is considered minor;
- *Draft Northern Area Plan 2010-2016* – This corridor is likely to conflict with the environmental polices proposed within the Draft Northern Area Plan 2010-2016;
- *Drainage (EIA) Regulations (Northern Ireland) 2001* – Under these regulations, the Department of Agriculture and Rural Development are required to consider whether any proposed drainage works are likely to have significant effects on the environment. It is likely that this corridor could have a moderate adverse impact on the hydrology and drainage conditions of the Main Valley Bogs SAC.
- *The Fisheries Act 1966 as amended 2001* – Under this Act, it is an offence to discharge deleterious matter into waters, which impact on fish, or spawning grounds. This western corridor intersects the River Main and a number of its tributaries thus requiring a number of potential crossings. There is the potential during construction and operation, for highway run-off to enter and pollute the River Main and its tributaries. This would also fall under the *Water Act (NI) 1999 and the Groundwater Regulations (NI) 1998*.

- *Planning Policy Statement 15* – This states that new development should ensure that it is not exposed to the direct threat of flooding, nor should it increase flooding elsewhere. This corridor would traverse areas susceptible to flooding.

12.9 Corridor 4 - Assessment Summary

12.9.1 Overview

The Central Corridor (Corridor 4) would provide a new section of dual carriageway for the A26 with the scheme almost completely using the existing road corridor for its whole length.

It is considered it would be possible to provide a route along the proposed corridor which would conform to DMRB geometric standards for a 120kph design speed.

This corridor is likely to impact upon bridge number 30466 which carries the existing A26 over Cloghmills Waters and the culvert-type structures numbered 31487 and 31488. Structure 30466 is of insufficient width to even carry one half of a full standard dual carriageway cross-section, and would therefore, as a minimum, need to be widened. Structures 31487 and 31488 both have a 25m width, but are considered insufficient to cater for a full standard dual carriageway and would both require widening. However, if this corridor was progressed, a decision may be taken to replace these structures, depending upon more detailed condition assessments.

Increasing the cross-section of the existing A26 route could potentially create additional severance for farms which operate on both sides of the existing road.

All of this corridor would effectively be constructed more central to the existing route and would be likely to involve significant disruption to road traffic on the existing A26. Extensive traffic management would be required. This corridor would result in the maximum disruption to existing traffic of all the corridors under consideration.

Corridor 4 has the potential to involve the maximum impact upon residential properties within the study area.

Widening of the existing A26 route would require the proposed corridor to pass through sections of poor ground (peat). This would be likely to result in ground improvement works being necessary to improve the quality of the road foundation.

Flood compensation measures are not considered a major issue with this corridor. However, storm water attenuation would need to be considered at the next stage of assessment.

Given the fact that Corridor 4 is almost wholly central to the existing route, this corridor would involve the most significant impact to existing utility services.

12.9.2 Environment

The principal environmental issues associated with the development of the Central Corridor are as follows:

- discernible change in ambient noise levels and local air quality currently experienced by the nearest residential properties to the existing A26 and sensitive ecological habitats of the Frosses Bog ASSI and Frosses North SLNCI. Possible improvements in road traffic noise and level of vehicle exhaust emissions due to improved travel conditions for motorists, particularly in terms of reduced levels and periods of traffic congestion;
- loss of amenity for the nearest residential properties situated on both sides of the A26 due to an increased physical footprint of the road which would require additional land acquisition from these properties resulting in the loss of private gardens, potential realignment or alteration of existing accesses and reduction in the distance of the road from the residential dwelling(s). The new road corridor is likely to be more visually intrusive and prominent in the immediate viewpoints of the nearest residential properties. Opportunities exist for natural screening from intervening topography, roadside development and vegetation;

- direct strip loss of areas of raised bog, floodplain and fen mire habitats, low-level shrubs and trees located adjacent to the existing A26 which could adversely impact on known areas of badger and otter activity along the alignment of this corridor. Indirect effects associated with road runoff and pollution from a chemical spill or motor vehicle accident during operation on the ecological integrity of the Frosses Bog ASSI which also forms part of the Main Valley Bogs SAC, a European protected site, and the Frosses North SLNCI which are both located directly adjacent to the northbound carriageway of the existing A26;
- potential direct physical damage to unknown, buried / in-situ archaeological remains and paleoenvironmental deposits due to road construction and direct impacts on the setting and appearance of Drumaddon House, a listed building, located directly adjacent to the southbound carriageway of the existing A26 and its junction with the B94 at Logans retail facility;
- increased area of hard and impervious road pavement surfaces along the existing A26 corridor would lead to further increases in the velocity and volume of road runoff and could alter natural drainage patterns, particularly at crossing points where additional drainage works would be required. Potential loss of available flood storage capacity and obstruction to the passage of floodwaters, however, this is not considered to be significant. Localised impacts on the water quality of the Cloghmills Water which is also a designated as Economically Significant under the *EC Fresh Fish Directive 78/659/EC* and a nutrient sensitive area under the Urban Waste Water Treatment Directive (UWWTD) (91/271/EEC) and the *Nitrates Directive (91/676/EEC)*, and
- delivery of potential positive physical fitness and journey ambience due to improvements in road safety, road travel conditions and local to through traffic conflicts. A level of driver stress and anxiety would still remain if direct local access connections are maintained for residential properties straddling both sides of the A26.

12.9.3 Safety

It is considered that the Central Corridor would improve traffic flow and provide a high speed transport corridor. The route improvement would remove private access onto the route, channelling all traffic turning movements to the grade separated junctions. Therefore the highway improvement would remove the current problems of poor overtaking opportunities; vehicles forming platoons behind slow-moving vehicles; and uncontrolled traffic movements on and off the carriageway (through private accesses). Therefore the safety performance of the corridor should significantly improve in relation to the current situation.

However, improvements in road safety would be expected with all the corridors.

12.9.4 Economy

The estimated cost of the Central Corridor is £48,669,000 (at 2005 Q1 prices). This cost-estimate includes a 22% optimism bias, but no risk allowance.

The economic performance of the corridor is as follows:

- NPV: £48,246,000
- BCR: 2.39

12.9.5 Accessibility

No assessment of accessibility has been undertaken for this stage 1 assessment.

12.9.6 Integration

This corridor would be likely to contravene the following land use and Government policies to a limited extent:

- Conserving Peatlands Statement;
- River Conservation Strategy;
- Planning Policy Statement 2 (PPS 2);

- Conservation (Natural Habitats) Regulations Northern Ireland 1995;
- Draft Northern Area Plan 2010-2016;
- Drainage (EIA) Regulations (Northern Ireland) 2001;
- The Fisheries Act 1966 as amended 2001; and
- Planning Policy Statement 15.

12.9.7 Assessment Summary Table

An assessment summary table for the Central Corridor (Corridor 4) is presented in Appendix F.

13 Corridor 5 – Eastern 1

13.1 Introduction

The Eastern 1 Corridor would seek to maximise the opportunity for off-line improvement, whilst balancing the need to minimise direct impact to farm buildings along the corridor.

For a short section north from the Glarryford junction, this corridor would utilise on-line improvement of the existing A26 carriageway. At a point in advance of the southern Frosses trees, the corridor would then divert off-line to the east and pass close, and parallel, to the Old Frosses Road.

The corridor would intersect with Lisnasoo Road, and some form of junction would be required. The corridor would continue northwards, crossing Cloghmills Water, before reaching the B94 (Drumadoon Road), where another junction would be required. The corridor would then crosses Mount Hamilton Road, where another junction potentially might be required, depending upon junction strategy.

The corridor then rejoins the existing A26 at a new junction with the A44, passing through an area occupied by the fields of several small farms.

This corridor would be unlikely to directly affect any residential properties or farm buildings. The engineering quality of the land is significantly better than that for both the Western and Central Corridors. This would be likely to reduce costs for importing material.

This corridor would have a major benefit in realigning the new road away from existing residential properties and farm buildings in most instances. However, as the corridor would be almost wholly greenfield construction, the scheme would require a significant amount of land to be acquired through compulsory purchase. Furthermore, the farming quality of the land is considered good and, combined with the significant farm severance issues associated with this corridor, there is likely to be a significant impact on the many farms which populate the eastern assessment area.

The Eastern 1 Corridor is presented on drawing A26-HWY-006 in Appendix A.

This chapter provides the broad assessment of the Eastern 1 Corridor (Corridor 5). A full description of this corridor is provided in Section 7.5.

13.2 Engineering Assessment

13.2.1 Geometry and Departures from Standard

The essence of Corridor 5 is a predominantly off-line solution, with over 85% of the corridor being wholly off-line in relation to the existing A26 route. The corridor has been designed to weave through the open agricultural land to the east of the existing A26, avoiding, where possible, residential dwellings and farm buildings.

It is considered that it should be possible to design an alignment within this corridor, both horizontally and vertically, that would not require any departures from standard, in relation to current design standards for a design speed of 120kph. However, as the corridor bisects several drumlins and valleys, any resulting alignment would be likely to result in deep cuttings and embankments.

Even though an alignment within this corridor would result in large quantities of material being excavated (for cuttings) and required for the embankments, it is considered that a vertical alignment should be able to be designed to produce a balance between the cut and the fill, minimising any requirement for import or export of material. This would be a significant cost saving for this corridor.

13.2.2 Junctions

Junction improvements, or new junctions would be required on the A26 for intersections with the following side roads:

- B64 (Station Road/ Springmount Road – Glarryford crossroads);
- Lisnasoo Road;
- B94 (Drumadoon Road); and
- A44 Drones Road.

13.2.3 Structures

Bridge numbers 10211 and 10212 which cross the River Clogh at the southern end of the scheme are considered to be outside the study area, and therefore outside the scope of this assessment.

Therefore, no existing structures along the current A26 route would be affected by this corridor.

There are a number of tributaries to the River Main that this corridor would cross. Although most of these are minor water courses and would only require culverts to accommodate the new road, there is likely to be one crossing of the Cloghmills Water which would require a new bridge. The span (and therefore the cost) of this bridge will depend on the angle that the new road crosses the river. However, depending on consultation with the Rivers Agency, there is the possibility that the river could be realigned in order to reduce costs. Matters relating to this issue would be considered further at stage 2, should this corridor be progressed.

For the purposes of cost-estimation, the assumed junction strategy includes for some grade separation through compact grade separated junctions (see Section 5.4). For this corridor that would result in thee new road bridges taking the side road over the new A26.

The route of this corridor would impact upon existing access arrangements for both the farming community and residential properties. In certain cases it may be appropriate to investigate the provision of alternative access arrangements which might include additional lengths of access track, relocated accesses, or even accommodation underpasses in exceptional circumstances.

13.2.4 Water Quality and Highway Drainage

The southern end of the Eastern 1 Corridor would seek to maximise the use of the existing A26 corridor and as a result should not directly impact upon the adjacent 1:100 year River Main floodplain. Where the corridor moves off-line to the east from the existing A26 route, it appears to follow the topographical watershed for the majority of its length and so should also not directly impact upon the adjacent 1:100 year River Main floodplain.

At the southern end, the corridor crosses one designated and four undesignated minor watercourses and it is possible that the majority of these minor watercourses will require culverts with fish beds and otter ledges. Further north, the corridor crosses one of the major River Main tributaries, the Cloghmills Water and it is assumed that this crossing would require a bridge structure as with the existing A26 route.

It is anticipated that the highway surface water run-off will generally be discharged into the associated River Main tributaries and watercourses. These outfalls would require pollution control provision as well as, almost certainly, attenuation facilities. Keeping the petrol interceptors above the flood level at outfalls at the northern and southern tie-ins, could be difficult and with any attenuation pond requiring excavations to be at least 1.0m below the outfall level, this could lead to ground water problems in these locations.

Emergency spillage ponds may also be required at the four proposed junctions for this corridor depending on traffic flows. These normally have a capacity of 50 cubic metres and are sited at the associated outfall. The possibility of groundwater problems at the two proposed intermediate junctions is not anticipated to be significant.

The surface water drainage strategy for the scheme would need to be agreed with the Rivers Agency and the Environment and Heritage Service and this would be undertaken during the stage 2 assessment.

13.2.5 Public/ Private Utility Services

The majority of the existing public and private services known to be present within the study area appear to be limited to the existing A26 route corridor and the adjacent B93 (Killagan Road) and Old Frosses Road corridors.

This Eastern 1 Corridor is predominantly off-line from the existing A26 corridor, however, it does follow close to the Old Frosses Road corridor for approximately 1.5km of its length. The following existing services will potentially be affected:

- at the southern end for approximately 1.5km, the corridor proposes on-line widening of the existing A26 which carries longitudinal BT underground fibre-optic cables along this whole length;
- at this southern end, the corridor also intersects a Water Service water main and an 11kV overhead NIE cable;
- as the corridor moves off-line from the A26 towards Lisnasoo Road, it would follow parallel to the Old Frosses Road and intersects a further five 11kV overhead NIE cables;
- where the corridor crosses the Lisnasoo Road, it intersects a Water Service water main;
- as the corridor approaches the Cloghmills Water crossing, it intersects a further 11kV overhead NIE cable and two 33kV overhead NIE cables;
- at the northern end, where the corridor crosses the B94 (Drumadoon Road) and approaches the tie-in to the A26, it intersects a Water Service water main, three 11kV overhead NIE cables and two MV overhead NIE cables; and
- at the northern end tie-in, the proposed junction with the A44 (Drones Road) utilises a section of the existing A26 corridor which carries BT underground fibre-optic cables and a Water Service water main.

The level of impact on these existing utility services and the associated diversion requirements will be assessed and confirmed during the stage 2 assessment. An allowance has been included within the cost estimate for this corridor for utility service diversion.

13.2.6 Geotechnical Issues

The Eastern 1 Corridor traverses hummocky, drumlin terrain on the eastern valley side of the River Main. The drumlins are hillocks comprising over-consolidated, lodgement glacial till. This material is generally suitable for reuse in earthworks, and the cut slopes do not normally cause problems. Therefore, it is likely that if a balance of earthworks could be achieved for this corridor, the requirement for import or export of material would be minimal. This would be a significant cost saving in relation to the other corridors.

The initial 1.3km section for the corridor north of Glarryford would be essentially over glacial till, but this section also includes a minor valley 0.5km north of Glarryford, where poor ground conditions comprising alluvial and peaty soils are likely to be present.

Just south of the Frosses Trees section, the corridor would deviate to the east onto the rising valley side of the River Main. The corridor generally threads between the drumlins, but where the corridor passes through drumlins, resulting in deep cutting slopes. Local areas of poor ground conditions may occur between the drumlins, where closed hollows have been infilled by alluvial deposits.

Where the corridor would cross the Clough Mills Water valley bottom, the geology largely comprises alluvial deposits.

To the north of the Clough Mills Water valley, this corridor would cross a rather more hummocky and irregular terrain, underlain by glacial till, and, locally, underlying Basalt bedrock. The drumlin hillocks seen further south are not present in this section. This may reflect a greater variability in the glacial till material, and locally poor ground conditions comprising alluvial

deposits may occur in places. Modest cut-fill earthworks are likely to be required to traverse this section.

13.2.7 Impact Upon Buildings and Property

Corridor 5 (together with Corridor 1) would be expected to have the least impact upon residential properties or other buildings within the study area out of all the corridors under consideration. It is considered, subject to more detailed assessment at Stage 2, that potentially a dual carriageway could be provided within Corridor 5 which resulted in no direct impact to any buildings. However, subject to confirmation of land ownership boundaries, some impact to land associated with buildings may result.

13.2.8 Construction issues

This corridor is predominantly off-line, and is considered to be on generally good ground. The alignment will produce a high volume of both cut and fill material, but it is considered that through design, a balance of material would be achievable. Therefore moving earthworks around site would in general be an off-line procedure and not disrupt existing A26 traffic.

Several new structures would be required for this corridor, including numerous culverts. No significant construction issues are envisaged for these structures.

Traffic management is not considered a significant issue for this corridor as the majority of the route is off-line in relation to the existing A26. However, towards the southern end of the scheme, traffic management may be an issue where a 1.3km section of the corridor would be more central to the existing route.

13.3 Traffic Assessment

13.3.1 Introduction

The transport impact of this corridor has been assessed on a preliminary basis. At this coarse stage of assessment, there is little difference between any of the corridors assessed with respect to traffic movements

13.3.2 Traffic Flow Changes

An estimate of road network flows for this corridor has been made. Detailed alignment and junction layouts have not yet been determined, the forecast flows, at this stage, for an improved A26 are therefore broad estimations, and assume that virtually all existing A26 traffic would transfer onto the new A26 dual carriageway for at least part of their journey.

For this stage 1 assessment it has been assumed that flow patterns on side roads would remain as with the present case.

Table 13.1 shows the broadly estimated flows on each road link for 2012, the notional year of opening, and for 2027, the design year, with the new A26 improvement in place. It has been assumed that a nominal number of vehicles per day transfer from the new A26 dual carriageway onto the old A26, based upon the limited number of properties along the remaining Old A26 route.

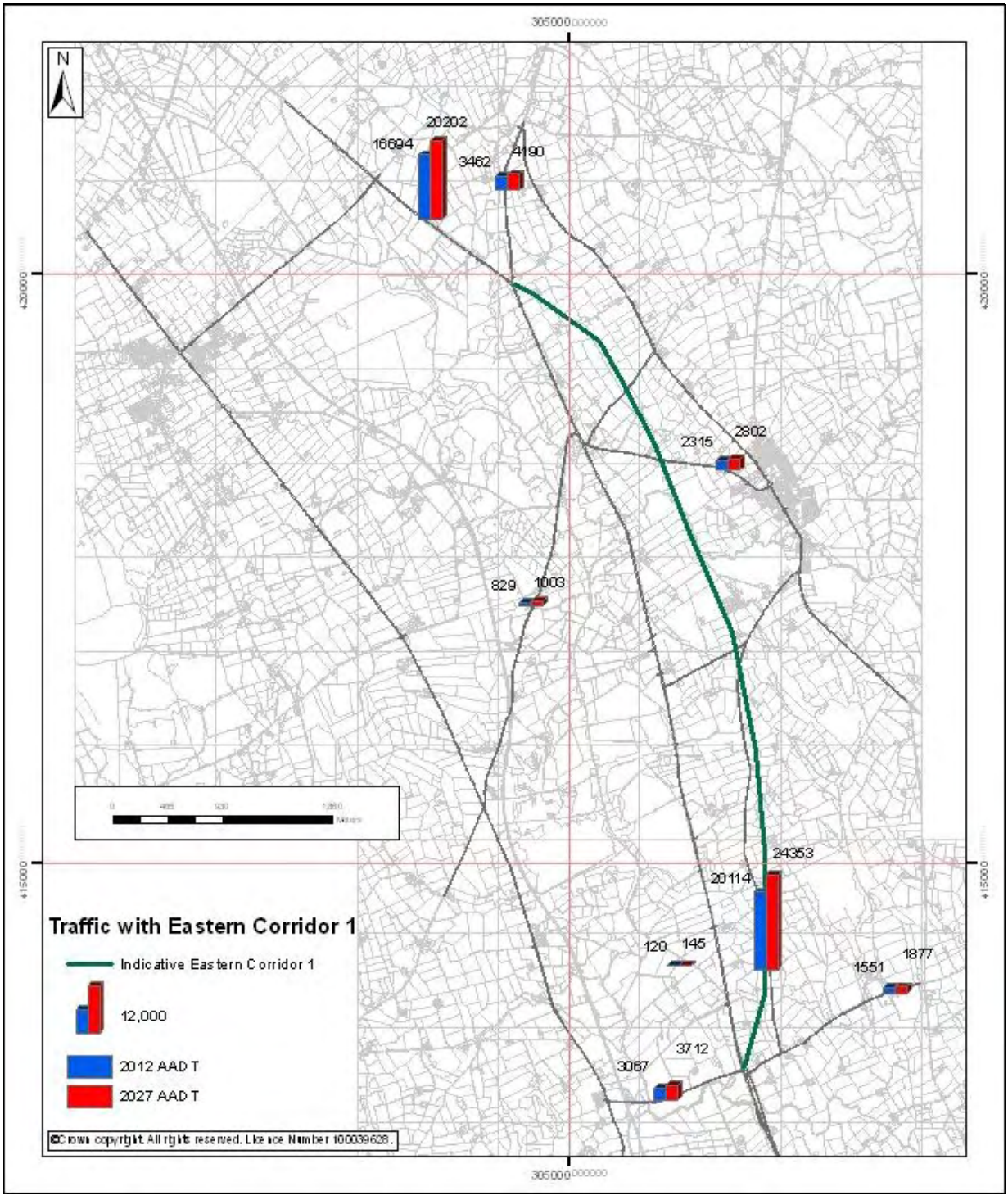
The results of this early traffic assessment are presented graphically in Figure 13.1 (overleaf).

It should be noted that the flows given in Table 13.1 are preliminary estimates. Origin-destination data was unavailable at the time of this study, and thus detailed estimating of re-routing of traffic was not possible. It is expected that this work should be undertaken at stage 2 should this corridor be progressed.

Table 13.1: Estimated Forecast Flows with A26 Improvement in place

Road	Direction of Flow	2012 Year of Opening AADT	2027 AADT
New A26 Improvement, north of B64	**northbound**	**10,021**	**12,133**
	southbound	**10,093**	**12,220**
(Old A26) Frosses Road	northbound	60	72
	southbound	60	73
B64 (Station Road), west of A26	*eastbound*	1,524	1,844
	westbound	1,543	1,868
B64 (Springmount Road) east of A26	*eastbound*	778	942
	westbound	773	935
Lisnasoo Road, east of A26	*eastbound*	1,076	1,303
	westbound	1,033	1,250
B93 (Killagan Road), west of A26	*northbound*	397	480
	southbound	432	523
B94 (Drumadoon Road), east of A26	*eastbound*	1,184	1,433
	westbound	1,131	1,369
A44 (Drones Road), north of A26	*northbound*	1,679	2,032
	southbound	1,783	2,158

Figure 13.1: Traffic Flows Eastern Corridor



13.4 Environment Objective

13.4.1 Introduction

The potential environmental impacts associated with the development of the Eastern 1 Corridor are detailed in this section.

13.4.2 Noise

The settlement pattern to the east of the existing A26 tends to be widely distributed along the existing A26 traffic route, the B94 (Drumadoon Road), and other minor roads that connect to Clogh Mills. The highest concentration of residences and farmhouses are located in the eastern

part of the study area. Terrain in this part of the study area is characterised by a gently to moderately undulating drumlin landscape and the development of an off-line eastern corridor would require sections to be constructed in deep cuttings. The width of the proposed road cross-section would allow for the incorporation of noise mitigation measures where appropriate and a level of natural noise attenuation would also be provided where the road is in cutting and due to the intervening drumlin topography which would act as a barrier to lateral noise transmission paths extending off the new road into the surrounding areas.

In total, there are approximately 54 residential dwellings located within 300m of the Eastern 1 Corridor, as follows:

- within 50m – 3 residential dwellings;
- 51m to 100m – 10 residential dwellings;
- 101m to 150m – 14 residential dwellings;
- 151m to 200m – 11 residential dwellings;
- 201m to 250m – 8 residential dwellings; and
- 251m to 300m – 8 residential dwellings.

Other non-residential receptors potentially affected by the construction and operation of the Eastern 1 Corridor include a church located directly adjacent to the eastbound carriageway of the B94 (Drumadoon Road).

Ambient noise levels across the agricultural land to the east of the existing A26 are relatively low and subject to the passage of small volumes of vehicles travelling on local roads such as the B94 (Old Frosses Road and Drumadoon Road), and operation of farming equipment and machinery. The introduction of a new dual carriageway road to the east of the existing A26 would lead to a discernible increase in ambient noise levels from road traffic activities (i.e. greater than 3dBA change in background noise levels), particularly on the facades of residential dwellings scattered across the moderately undulating drumlin topography between the eastern side of the existing A26 and the B94 (Old Frosses Road). This would result in a significant change in ambient noise levels currently experienced once the new road is operational. The full extent of the change in exposure to road traffic noise would vary along its length and the number and type of properties potentially affected.

It is likely that the development of the Eastern 1 Corridor would result in noise improvements along the existing A26 through the transference of through-traffic into to the new off-line highway. However, further investigation into this particular issue will be examined during the next stage of scheme development.

There is the possibility that some residential dwellings could qualify for noise insulation where ambient levels exceed 68dBL_{A10}, 18 hour under the *Noise Insulation Regulations (Northern Ireland) 1995.* A package of appropriate noise mitigation measures would be required to assist an off-line eastern corridor in conforming with requisite noise guidelines and operating criteria.

The level of noise exposure to be encountered by sensitive ecological areas would be significantly less than for the development of either an off-line western corridor or widened central corridor.

Drawing number A26-ENV-013 (Appendix D) shows the distribution of noise sensitive receivers within 300m of the Eastern 1 Corridor.

13.4.3 Local Air Quality

There are approximately 38 residential dwellings located within 200m of the Eastern 1 Corridor which would be exposed to temporary episodes of construction dust and/or motor vehicle emissions (i.e. from both stationary and flowing traffic) during operation as follows:

- within 50m – 3 residential dwellings;
- 51m to 100m – 10 residential dwellings;

- 101m to 150m – 14 residential dwellings; and
- 151m to 200m – 11 residential dwellings.

The introduction of this new off-line road corridor would result in the introduction of a new and significant source of vehicle exhaust emissions, particularly PM_{10}, NO_2, CO, benzene and 1, 3 butadiene. These emissions would gradually reduce local air quality over time for those residential properties, agricultural land and sensitive ecology areas nearest to this corridor. However, the effects of any emission increases experienced by sensitive receptors in the vicinity of an eastern corridor may be offset by improved travelling conditions, reduced periods of traffic congestion and the transference of through traffic flows from the existing A26 to the new off-line corridor which could reduce the volume of vehicle exhaust emissions and improve local air quality for residential properties located along both sides of the A26. Furthermore, the sensitive ecological receptors (i.e. Frosses Bog ASSI and the Frosses North SLNCI) and other habitats of interest to protected fauna species would be less exposed to the potential adverse effects of vehicle exhaust emissions during operation and entrainment of dust during road construction works of an off-line western corridor or widened central corridor.

Appropriate mitigation measures will be identified in order to minimise the impact of the scheme on local air quality during scheme construction. A package of dust suppression and traffic management measures will be developed in consultation with the Local Authority EHOs and DoE – EHS and in accordance with the Code of Construction (CoCP). Operational mitigation measures for this scheme proposal would be developed in more detail during the Stage 2 and 3 scheme assessment process.

Drawing number A26-ENV-014 (Appendix D) shows the distribution of sensitive air quality receptors within 200m of the Eastern 1 Corridor.

13.4.4 Greenhouse Gases

At this stage it is too early to determine the levels and significance of greenhouse gas emissions directly attributed to the development of a new off-line eastern corridor. It is acknowledged, however, that the emissions of greenhouse gases such as CO_2 could potentially change as a result of the development of an eastern corridor and new advancements in vehicle design and cleaner fuel technologies. The quantum of change to the generation of existing greenhouse gases currently emitted into the local airshed would primarily be attributed to the improved conditions of the new road traffic environment and volume of future traffic flows.

Emissions of greenhouse from the road transport sector are expected to rise in the UK as a whole, as growth in road traffic outweighs benefits from adoption of cleaner technology. Subsequently, further investigation into the potential contributions of road traffic travelling on the Eastern 1 Corridor to climate change as a result of potential increased greenhouse emissions (i.e. CO_2) would be undertaken during the next stages of road design and development.

13.4.5 Landscape

The Eastern 1 Corridor traverses an attractive undulating drumlin landscape featuring a strong field pattern geometry defined by a network of largely intact hedgerows and hedgebanks with individual and small blocks of trees punctuating field boundaries and the crests of low-level ridgelines. Land to the east of the A26 contains the greatest amount of good quality agricultural land and highest number of properties in the study area.

Development of an off-line eastern corridor would result in several sections of the corridor being in deep cutting. Whilst, the undulating nature of the terrain traversed by the corridor would afford opportunities for natural concealment and screening, new road development would cut across the existing landscape resulting in significant changes and modifications to local landscape character. This could be a visually prominent feature for the nearest residential properties to the corridor as well as for some of the residential properties situated on the western periphery of Clogh Mills. Furthermore, the amenity of the nearest residential properties to this corridor would be adversely affected due to the introduction of a major built element into an otherwise attractive rural setting.

This corridor would sever a number of mature hedgerows and require the removal of a small number of mature trees. A large area of the 'best and most versatile' agricultural land would also be lost to the Eastern 1 Corridor which is a significantly larger amount than any of the other corridors with the exception of the East-West Corridor. The Eastern 1 Corridor would also involve a new crossing of the Cloghmills Water, Lisnasoo Road and B94 (Drumadoon Road).

The corridor would involve the significant reprofiling and acquisition of farmland along its proposed alignment to accommodate sections of cut and fill, road drainage systems, landscaping and new structures. The extent of this reprofiling and acquisition would be dependent on local ground conditions.

An effective landscaping strategy would need to be developed to soften and, where possible, alleviate potentially adverse effects associated with changes and modifications to the local landscape character and visual setting within the study area, particularly for the residents of the nearest properties likely to be most affected by the new road corridor.

A landscape strategy incorporating a package of mitigation measures and design treatments would be developed to integrate this corridor into the existing landscape fabic as effectively as possible. These measures may partially mitigate the cutting and filling impacts by planting with native woodland mixes and the extent of wooded areas would not be totally out of keeping with the current visual appearance of this area. This would go some way to merging the new road into the surrounding landscape character over time but some high embankments would be required and these would be more difficult to visually integrate. A key focus of the landscape mitigation would be the approaches to and crossing of watercourses. Such measures would be developed as part of the Stage 2 Scheme Assessment work.

13.4.6 Biodiversity

The Eastern 1 Corridor would not directly or indirectly affect any statutory or non-statutory designated nature conservation sites.

The dominant habitat type along the majority of the Eastern 1 Corridor is improved grassland with some scattered patches of semi-improved neutral and wet grassland which is in places of potential interest to wintering and breeding birds and badgers which are protected under the *Wildlife (Northern Ireland) Order 1985*. A number of field boundaries to the east of the A26 are defined by hedgerows with the crests of certain drumlins featuring clumps of mature trees.

The results of wintering surveys undertaken between November 2006 and February 2007 confirmed the presence of badger activity and a main sett along a hedgebank in the vicinity of the corridor where it starts to deviate to the east of the existing A26. Furthermore, these surveys also indicated the presence of protected wintering bird species listed under Schedule 1 of the *Wildlife (Northern Ireland) Order 1985,* namely fieldfare and redwing to be present and active along the alignment of this corridor. It is likely that mature trees and buildings in the immediate vicinity of this corridor could also be of interest to a variety of bat species and raptors such as the barn owl which are fully protected under the *Wildlife (Northern Ireland) Order 1985.* Certain mature trees could also be subject to tree preservation orders.

The impact on river corridors and local watercourses would be confined to the Cloghmills Water and some smaller unnamed tributaries flowing east-west to the River Main. It is considered unlikely at this stage that the Eastern 1 Corridor would result in any significant loss of habitats, fragmentation or severance issues, although fauna proof fencing and underpasses may need to be installed along certain southern sections of this corridor.

A series of ecological mitigation measures would be developed to following the completion of targeted species surveys and as part of the Stage 2 Scheme Assessment work. These measures may include but not be limited to the installation of fauna-proof fencing to prevent wildlife from directly entering the roadway, fauna underpasses to maintain wildlife connectivity and movements across the roadway, re-routing the road to minimise or avoid the direct loss and/or severance of sensitive habitats, pre-construction closure and relocation of fauna populations (i.e. known badger setts), provision of compensatory habitats and offsets.

13.4.7 Heritage of Historic Resources

There are no listed buildings or scheduled archaeological features located along the proposed alignment of the Eastern 1 Corridor. However, a number of built heritage features exist in Clogh Mills which is located approximately 500m further to the east of the corridor. Clogh Mills contains a variety of historic resources, including:

- Clogh Castle - a scheduled monument containing poorly preserved and unstable ruins of rubble and mortar gatehouse;
- The Church of the Sacred Heart – a listed building;
- Killagan Bridge – a listed building; and
- Killagan Parish Church – a listed building.

These listed buildings and scheduled monument are located a sufficient distance away from the proposed Eastern 1 Corridor and, therefore, would not be directly affected. It is also considered unlikely that the setting and appearance of these heritage features in the local landscape would be adversely affected by this corridor although this would be confirmed as part of further investigations to be undertaken during the next stage of road design and development.

There are also a considerable number of archaeological features including raths, souterrians, enclosures and mounds located along sections of the Eastern 1 Corridor. The potential exists for this corridor to encounter unknown, buried or in-situ archaeological remains of importance during road construction. It is on this basis that any proposed development of this corridor includes:

- comprehensive surface archaeological survey;
- potential subsurface testing and surveys programmes in areas identified as likely to be of high archaeological potential;
- erection of protective fencing and other appropriate measures around any areas of potential 'archaeological sensitivity';
- implementation of an archaeological watching brief by a suitably qualified archaeologist to ensure that any unknown archaeological remains or deposits identified during road construction can be recorded; and
- possible salvage excavations, or other appropriate rescue-record measures, for the in-situ conservation of archaeological remains.

Such measures would be necessary in those areas involving significant excavation and ground penetration works (i.e. road cutting works) and the installation of water quality control and road drainage systems.

13.4.8 Water Environment

The Eastern 1 Corridor would traverse the upper catchment areas of the River Main and its associated tributaries. It would traverse approximately 0.7 km of land situated within the 1:100 year flood extent of the River Main, namely where it crosses the Cloghmills Water. A significant area of the 1:100 year flood extent would be directly lost to the development of this corridor which is unlikely to result in any significant reduction in available flood storage capacity within this part of the River Main catchment.

The lateral extent of the 1:100 year flood event within the study area is shown on Drawing number A26-ENV-003 (Appendix D).

There are a number of water quality monitoring stations located on the Eastern 1 Corridor at Cloghmills and Killagan Bridge. In the upstream catchment areas to the east of the existing A26 there are several structures located along the Killigan Water prior to its confluence with the River Main, a short distance to the west of the A26/ A44 (Drones Road) junction. These structures include a bridge located at Flax Mill, Drones Road Bridge, Killagan Bridge, and Frosses Road Bridge, respectively. Several of these bridge structures have piers located in the

main channel of the Killigan Water which potential obstruct the passage of floodwaters and act as potential depositories which could change the storage volume at these locations.

The principal structures along Cloghmills Water include Cloghmills Bridge, and Drumnaglek Bridge along Frosses Road.

There are likely to be up to two crossings of minor watercourses and numerous crossings of unnamed drainage lines required for the development of Eastern 1 Corridor as follows:

- one crossing of the River Clogh at the initial diverge point in the southern part of the study area;
- one crossing of the Killagan Water on approach to the northern 'tie-in' point; and
- numerous crossings of unnamed and natural drainage lines, flowing in an east-west direction to the River Main.

The principal environmental hazards associated with the development of Eastern 1 Corridor are:

- increased rate and volume of road runoff associated with the introduction of new hard, impervious road pavement surfaces into an area otherwise use to 'greenfield runoff';
- increased flood risk to the introduction of additional permanent physical obstructions in watercourses (i.e. transverse drainage culverts and bridge structures) and floodplains (i.e. widening of embankments on the approaches to bridges), namely at the Cloghmills Water;
- increased levels of afflux both upstream and downstream within the Cloghmills Water and Killagan Water;
- pollution of watercourses from road runoff (i.e. influx of sediment laden runoff from disturbed and exposed areas during construction and or dissolved or particulate matters such as road surface wear and grit, rubber fragments from tyres, hydrocarbons from vehicle emissions, etc, during operation);
- accidental chemical spillages and hydrocarbon releases during motor vehicle accidents;
- increased risk of erosion/scouring and flooding in the catchment due to the alteration of natural drainage patterns (i.e. artificial concentration and obstruction of overland flows); and
- degradation of local water quality due to the above factors which could lead to a detrimental impact on aquatic ecosystems of the River Main.
- The Cloghmills Water is already a designated nutrient sensitive area under the *Urban Waste Water Treatment Directive (UWWTD) (91/271/EEC)* and the *Nitrates Direcitve (91/676/EEC)* and an economically significant watercourse under the *Freshwater Fish Directive (78/659/EEC).*

A number of soil and water management measures and water quality control systems would be required to mitigate any potential water quality impacts during both construction and operation of Eastern 1 Corridor. This may include, but would not be limited to the use of sustainable drainage systems (i.e. swales, filter drains, balancing ponds and ditches), petrol interceptors, water quality control ponds, soakways and careful drainage design. The drainage designs for this corridor would be developed in more detail as part of the Stage 2 Scheme Assessment work.

13.4.9 Physical Fitness

As with all corridors under assessment, the Eastern 1 Corridor could be designed to incorporate pedestrian footways and cycleways, but given the high-speed nature of the corridor, the

decision may be to deter pedestrians and cyclists from the route. This strategy will be considered in greater detail at stage 2.

Opportunities to introduce dedicated footpaths and cycle-ways along sections of the existing A26, and other parts of the local road network, could be afforded to improve access and connectivity for the local community. Such measures may be necessary given that this corridor passes within the greater density of residential properties encountered by any of the corridors under consideration. Allowances may also need to be made for equestrians and farmers operating machinery or rotating stock on land severed by this corridor.

The development of an off-line Eastern 1 Corridor would significantly reduce the volume of traffic travelling along the existing A26 improving conditions and general road safety for both pedestrians and cyclists.

13.4.10 Journey Ambience

Eastern 1 Corridor would be designed to meet requisite standards for a rural dual carriageway which would significantly improve the existing road traffic environment of the A26 through the provision of additional offline road capacity with a new and higher travel speed, new and better quality road pavement surfaces and a reduction in traffic volumes using the A26 and conflicts between local and through traffic. These factors would contribute to an overall improvement on the local road network in terms of road safety, traffic congestion, particularly during peak daily travel and holiday periods, travel times and enhance North-South connections within Northern Ireland.

Overall, the development of this corridor would assist to lessen current levels of driver stress and anxiety by reducing the quantum of local and through traffic conflicts currently experienced by motorists traveling on the existing A26.

13.5 Safety Objective

13.5.1 Accidents

It is likely that improving the existing A26 carriageway from S2 to a D2AP carriageway would improve the safety performance of the A26. The congested nature of the existing route, with the lack of safe overtaking opportunities, currently results in a high proportion of shunt-type accidents. Improving the design standard of the route and the capacity is likely to lead to the A26 becoming a much safer, high-speed transport corridor.

Specifically, this largely off-line corridor would take the heavy volume of through-traffic away from the existing corridor, which serves a number of residential properties and farm accesses. Therefore, this corridor would be likely to reduce the potential for accidents associated with the following:

- Pedestrians. There would be little requirement for pedestrians to use the Corridor 5 transport corridor as it would not pass through any residential areas. Pedestrian would be far more likely to utilise the existing A26 corridor, which would have a greatly reduced throughput of traffic and would become a more pleasant pedestrian environment; and
- Vehicles using private direct accesses off the main road. The standard of the improved A26 highway would not permit direct private access onto the main carriageway. Access would be routed via the proposed key junctions. This will create a safer environment for vehicles entering and leaving the route.

Given the early stage of design for this study, it has not been possible to undertake a quantitative analysis to assess accident rates for the proposed route. However, the above qualitative assessment suggests accident rates for the road should reduce significantly as a result of this corridor being implemented.

13.5.2 Security

Given the rural nature of the A26 study area, security is unlikely to be a factor in deciding upon corridor preference. Therefore no assessment of security has been undertaken at this stage of assessment.

13.6 Economy Objective

13.6.1 Cost-Estimate

The cost- estimate for this corridor has been based on the following information:

- 5.5 km of off-line dual carriageway;
- 1.5 km of dual carriageway based along the existing route;
- 2.2 km of access roads to dwellings;
- 1.0 km of feeder roads;
- 3 nr overbridges;
- 2 nr small river crossings; and
- 1 roundabout

The following earthworks quantities have been estimated and priced:

- Earthworks cut volume 550,596 m^3;
- Earthworks fill volume 173,828 m^3; and
- Topsoil volume 82,346 m^3.

Given the early stage in the design process for this assessment, it was necessary to make a number of assumptions to develop a stage 1 cost estimate. These assumptions are listed below:

- agricultural land quality is relatively poor to the west of the existing A26 and land cost has therefore been assumed as £15,000 per acre (as advised by VLA);
- given the relatively poor land quality to the west of the A26, farm or property severance is likely to be limited. Compensation costs have been assumed at 25% of the scheme cost;
- All roads require temporary fencing;
- All roads require boundary fencing;
- Safety barrier allowed for the full length of the central reserve and an allowance at junctions;
- All cut material is to be reused on site;
- Raised rib edge line both sides; and
- 475 mm thick road construction.

The total estimated cost of this corridor, including a 22% optimism bias (see Section 8.4.2) is **£46,147,000**. A summary of the cost-estimate is provided in Table 13.2

Table 13.2: Cost-estimate Summary for Eastern Off-Line Corridor

Cost Item	Cost (£) - 2006 Q4	% of cost
Preliminaries	£ 3,221,776.00	8.04%
Site Clearance	£ 98,304.27	0.25%
Fencing & env. barriers	£ 390,352.67	0.97%
Safety fences	£ 692,011.67	1.73%
Drainage	£ 2,257,179.23	5.63%
Earthworks	£ 5,531,035.44	13.80%
Pavements	£ 6,805,312.31	16.98%
Kerbs & footpaths	£ 457,766.49	1.14%
Traffic signs & markings	£ 421,215.52	1.05%
Street lighting	£ 372,788.61	0.93%
Electrical works	£ 15,151.41	0.04%
Landscaping	£ 574,175.14	1.43%
Overbridges	£ 1,500,000.00	3.74%
River crossings	£ 400,000.00	1.00%
Accommodation works	£ 937,366.99	2.34%
Statutory bodies	£ 1,115,708.91	2.78%
Sub total	**£ 24,790,144.66**	61.86%
Contractor's O&P @ 10%	£ 2,479,014.47	6.19%
Sub total	**£ 27,269,159.13**	68.04%
Land costs	£ 1,069,316.63	2.67%
Compensation costs	£ 6,817,289.78	17.01%
Sub total	**£ 35,155,765.54**	87.72%
Preparation (9%)	£ 3,164,018.90	7.89%
Supervision (5%)	£ 1,757,788.28	4.39%
Sub total	**£ 40,077,572.71**	100.00%
Optimism Bias (22%)	£ 8,817,066.00	22.00%
TOTAL ESTIMATED COST (2006 Q4)	**£ 48,894,638.71**	
TOTAL ESTIMATED COST (2005 Q1 @ - 5.62%)	**£ 46,146,760.02**	

13.6.2 Risk

A risk assessment was carried out for this corridor. The methodology adopted is presented in section 8.4.2.

An early risk register was developed for this assessment. The full risk register can be found in Appendix E.

The following is a summary of what are considered to be the most significant risks to this corridor:

- scheme costs could exceed the budget. This could be as a result of initial under-estimation or error, or unexpectedly high construction inflation. The implications of this could range from needing to seek additional funding, or result in the scheme being suspended in favour of cheaper schemes;
- uncertainty relating to land compensarion costs; and
- geotechnical risks exist for this corridor in that the ground conditions might not be as good as anticipated, resulting in additional costs for import and export of earthworks.

13.6.3 Public Accounts

Based upon a coarse assessment of impact to public accounts, Table 13.3 summarises the public accounts for the Eastern 1 Corridor. An explanation of the composition of the table is provided in section 8.4.4.

Table 13.3: Public Accounts Table for Eastern 1 Corridor

	All Modes Total	**Road**	**Bus**
Local Government Funding			
Revenue	0	0	0
Operating Costs	0	0	0
Investment Costs	0	0	0
Developer & Other Contributions	0	0	0
Grant/ Subsidy Payments	0	0	0
NET IMPACT	**0**	0	0
Central Government Funding			
Revenue	0	0	0
Operating Costs	5,661	5,661	0
Investment Costs	32,331	32,331	0
Developer & Other Contributions	0	0	0
Grant/ Subsidy Payments	0	0	0
Indirect Tax Revenue	-4,288	-4,288	0
NET IMPACT	**33,704**	33,704	0
TOTAL Present Value of Costs (PVC)	**33,704**		

13.6.4 Transport Economic Efficiency

A summary of the coarse transport economic efficiency assessment is provided below in Table 13.4.

Table 13.4: Economic Efficiency of the Transport System (TEE) for the Eastern 1 Corridor

	All Modes Total	**Road**		**Bus**
Consumers				
User Benefits (£000s)				
Personal Travel				
Travel Time	34,074	34,074		0
Vehicle Operating Costs	-2,945	-2,945		0
User Charges	0	0		0
During Construction & Maintenance	-127	-127		0
NET CONSUMER BENEFITS	**31,003**	31,003		0
Business				
User Benefits		Personal	Freight	Passengers
Travel Time	51,254	37,306	13,948	0
Vehicle Operating Costs	-3,872	-239	-3633	0
User Charges	0	0	0	0
During Construction & Maintenance	-259	-188	-72	0
Sub Total	**47,123**	36,880	10,244	0
Private Sector Provider Impacts				
Revenue	0			0
Operating Costs	0			0
Investment Costs	0			0
Grant/ Subsidy	0			0
Sub Total	0			0
Other Business Impacts				
Developer Contributions	0	0		0
NET BUSINESS IMPACTS	**47,123**			
TOTAL (£000)				
Present Value of Transport Economic Efficiency Benefits	**78,126**			

Table 13.5 provides an overall summary of the economic performance of the Eastern 1 Corridor.

Table 13.5: Summary of Monetised Costs and Benefits for Eastern 1 Corridor

Cost or Benefit	Sum (£000)	Comments
Consumer User Benefits	31,003	
Business User benefits	47,123	
Private sector Provider Impacts	0	
Other Business Impacts	0	
Accident Benefits	0	
Carbon Benefits	-609	
Present Value of Benefits (PVB)	**77,517**	
Local Government Funding	0	
Central Government Funding	33,704	
Present Value of Costs (PVC)	**33,704**	
Overall Impacts		
Net Present Value (NPV)	**43,813**	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	**2.300**	BCR=PVB/PVC

An explanation of the composition of tables 13.4 and 13.5 is provided in section 8.4.5.

It can be seen from Table 13.5 that the results of the coarse economic assessment would indicate that the Eastern 1 Corridor would be likely to deliver a positive benefit to cost ratio (BCR) of 2.30, with a net present value (NPV) of over £43million.

However, these results should be read in conjunction with the assumptions and limitations listed in Section 8.4.5.

13.6.5 Reliability

Reliability has not been assessed for this stage 1 assessment, as discussed in section 8.4.3.

13.6.6 Wider Economic Impacts

The wider economic impacts objective has not been assessed for this stage 1 assessment. See section 8.5 for details.

13.7 Accessibility Objective

The accessibility objective has not been assessed for this stage 1 assessment. See section 8.5 for details.

13.8 Integration Objective

13.8.1 Transport Interchange

The transport interchange sub-objective has not been assessed for this stage 1 assessment. See section 8.6.1 for details.

13.8.2 Land Use Policy

The following land use policies would impact on Corridor 5:

- River Conservation Strategy – This corridor could have a minor impact on the River Main, its tributaries, and its floodplain, and therefore would not comply with the objectives of the river conservation strategy, to maintain and enhance the ecological integrity and biodiversity of rivers. However, the majority of this corridor would seek to

utilise the existing road corridor, so the extent to which the policy would be contravened would be limited.

13.8.3 Other Government Policies

The other Government policies that would also affect this corridor are listed as follows:

- Conservation (Natural Habitats) Regulations Northern Ireland 1995;
- Conservation of Natural Habitats & Wild Flora & Fauna Directive (92/43/EEC) as transposed by the Conservation (Natural Habitats) Regulations Northern Ireland 1995; and
- Draft Northern Area Plan 2010-2016 – This corridor is likely to conflict with the environmental polices proposed within the Draft Northern Area Plan 2010-2016.

13.9 Corridor 5 - Assessment Summary

13.9.1 Overview

The Eastern 1 Corridor would provide the opportunity to deliver an almost wholly off-line solution to dualling the A26, which would allow construction with a minimal impact to existing traffic. It is considered that a dualling solution could be delivered in accordance with design standards with no obvious departures from standard required.

A major benefit of such an off-line solution would be that traffic management issues, during construction, would be minimised, with the vast majority of construction being away from the existing A26. However, as the majority of the route would be off-line new construction, this corridor, along with Corridors 1 and 6, would be likely to require the largest amount of land-take.

Ground conditions for this corridor are considered the best of all the corridors under consideration. The ground is generally understood to comprise glacial till which is generally suitable for reuse in earthworks. Therefore, import and export of earthworks should be minimal for this corridor.

An advantage of the Eastern 1 Corridor would be that it would largely route the improved A26 away from residential properties, but there could be a perceived disbenefit associated with the utilisation of good quality farm land for road construction and there would be disruption and severance issues to the farms affected along the corridor.

The Eastern 1 Corridor, together with Western 2 Corridor, would be expected to have the least impact to buildings or residential property of all the corridors under consideration.

13.9.2 Environment

The principal environmental issues associated with the development of the Eastern 1 Corridor are as follows:

- discernible change in ambient noise levels and local air quality currently experienced by the nearest residential properties scattered across agricultural land to the east of the existing A26 and along the Old Frosses Road due to the introduction of a new dual carriageway road. Possible improvements in road traffic noise and level of vehicle exhaust emissions due to improved travel conditions for motorists, particularly in terms of reduced levels and periods of traffic congestion along the existing A26 and possibly across the study area;
- loss of the greatest amount of good quality agricultural land, severance and disruption of strong field pattern geometry and hedgerows, alteration to the existing landform due road cuttings and embankments and prominence of the new road corridor in both immediate and long distance views within and peripheral to the study area. Opportunities for concealment and natural screening due to the intervening drumlin topography and vegetation;
- direct loss of areas of improved grassland, hedgerows and tress of potential interest to a variety of bats and breeding birds, physical disruption to a main badger sett and a minor loss of river corridor habitat along the Cloghmills Water. Unlikely to be any

indirect effects on any statutory or non-statutory sites of nature conservation importance which are all situated to the west of the existing A26;

- potential direct physical damage to unknown, buried / in-situ archaeological remains due to road construction and direct impacts on the setting and appearance of Drumaddon House, a listed building, located directly adjacent to the southbound carriageway of the existing A26 and its junction with the B94 Drumadoon Road);
- introduction of new, hard and impervious road pavement surfaces along the existing A26 corridor would increase in the velocity and volume of road runoff altering local drainage patterns and regimes, minor loss of available flood storage capacity and obstruction to the passage of floodwaters within the Cloghmills Water and potential localised impacts on the water quality of the Cloghmills Water which is a designated as Economically Significant under the *EC Fresh Fish Directive 78/659/EC* and a nutrient sensitive area under the *Urban Waste Water Treatment Directive (UWWTD) (91/271/EEC)* and the *Nitrates Directive (91/676/EEC);*
- delivery of potential positive physical fitness and journey ambience due to improvements in road safety, road travel conditions and local to through traffic conflicts.

13.9.3 Safety

It is considered that the Eastern 1 Corridor would improve traffic flow and provide a high speed transport corridor. The route improvement would remove private access onto the route, channelling all traffic turning movements to the grade separated junctions. Therefore the highway improvement would remove the current problems of poor overtaking opportunities; vehicles forming platoons behind slow-moving vehicles; and uncontrolled traffic movements on and off the carriageway (through private accesses). Therefore the safety performance of the corridor should significantly improve in relation to the current situation.

However, improvements in road safety would be expected with all the corridors.

13.9.4 Economy

The estimated cost of the Eastern 1 Corridor is £46,147,000 (at 2005 Q1 prices). This cost-estimate includes a 22% optimism bias, but no risk allowance.

The economic performance of the Eastern 1 Corridor is as follows:

- NPV: £44,813,000
- BCR: 2.30

13.9.5 Accessibility

No assessment of accessibility has been undertaken for this stage 1 assessment.

13.9.6 Integration

This corridor would be likely to contravene the following land use and Government policies to a limited extent:

- River Conservation Strategy;
- Planning Policy Statement 2 (PPS 2);
- Conservation (Natural Habitats) Regulations Northern Ireland 1995;
- Draft Northern Area Plan 2010-2016;

13.9.7 Assessment Summary Table

An assessment summary table for the Eastern 1 Corridor is presented in Appendix F.

14 Corridor 6 – East-West Corridor

14.1 Introduction

The East-West Corridor would provide a combination of the previously described corridors (from south to north) of Eastern 1 (off-line to the east) with Western 1 (off-line to the west).

From the Glarryford junction, this corridor would match the Eastern 1 Corridor for the first 5.5km (approx), to a point where the corridor would cross Cloghmills Water. At this location the corridor would deviate to the northwest and diagonally cross the existing A26 immediately to the north of the existing A26 junction with the B93 (Killagan Road). The corridor would then join the northern section of the Western 2 Corridor.

This corridor would be delivered almost wholly off-line, which would be of benefit in terms of traffic management during construction. The scheme would benefit from utilising the poor quality agricultural land to the west for the majority of the corridor, but would impact upon good quality agricultural land to the north of the corridor.

The East-West Corridor is presented on drawing A26-HWY-006 in Appendix A.

This chapter provides the broad assessment of the East-West Corridor (Corridor 6). A full description of this corridor is provided in section 7.6.

14.2 Engineering Assessment

14.2.1 Geometry and Departures from Standard

This corridor is a largely off-line corridor comprising two distinct parts. The initial 5km of the corridor, the southern part of the corridor, between Glarryford and the B94 (Drumadoon Road) is as Corridor 5, the Eastern 1, which would weave through the open agricultural land avoiding, where possible, residential dwellings and farm buildings. The corridor then crosses the existing A26, to the west, to utilise less-populated land, thereby minimising the impact on existing properties and farms. The most northern part of this corridor is as proposed for Corridors 1, 2 and 3.

It is considered that it should be possible to design a horizontal alignment that does not require any departures from standard in relation to current design standards for a 120kph design speed. However, as the corridor would bisect several drumlins and valleys, any resulting alignment would be likely to result in deep cuttings and embankments.

The southern 5km of this corridor would be likely to require a large quantity of material being excavated (for cuttings) and required for the embankments. It is considered that a vertical alignment could be developed which would produce a balance between the cut and the fill, minimising the requirement for import or export of material. This would be a significant cost saving for this corridor.

14.2.2 Junctions

Junction improvements, or new junctions would be required on the A26 for intersections with the following side roads:

- B64 (Station Road/ Springmount Road – Glarryford crossroads);
- Lisnasoo Road;
- B93 (Killagan Road)/ B94 (Drumadoon Road); and
- A44 Drones Road.

14.2.3 Structures

Bridge numbers 10211 and 10212 which cross the River Clogh at the southern end of the scheme are considered to be outside the study area, and therefore outside the scope of this assessment.

Therefore, no existing structures along the current A26 route would be affected by this corridor.

There are a number of tributaries to the River Main that this corridor would cross. Although most of these are minor water courses and would only require culverts to accommodate the new road, there is likely to be one crossing of the Cloghmills Water which would require a new bridge. The span (and therefore the cost) of this bridge will depend on the angle that the new road crosses the river. However, depending on consultation with the Rivers Agency, there is the possibility that the river could be realigned in order to reduce costs. Matters relating to this issue would be considered further at stage 2, should this corridor be progressed.

For the purposes of cost-estimation, the assumed junction strategy includes for some grade separation through compact grade separated junctions (see Section 5.4). For this corridor that would result in thee new road bridges taking the side road over the new A26.

The route of this corridor would impact upon existing access arrangements for both the farming community and residential properties. In certain cases it may be appropriate to investigate the provision of alternative access arrangements which might include additional lengths of access track, relocated accesses, or even accommodation underpasses in exceptional circumstances.

14.2.4 Water Quality and Highway Drainage

The southern end of this east-west corridor would seek to maximise the use of the existing A26 corridor and as a result should not directly impact upon the adjacent 1:100 year River Main floodplain. Where the corridor moves off-line to the east from the existing A26 route, it appears to follow the topographical watershed for the majority of its length and so should also not directly impact upon the adjacent 1:100 year River Main floodplain. At the northern end, the corridor switches off-line to the west, where it would follow immediately adjacent to the 1:100 year River Main floodplain (see drawing number A26-ENV-003, Appendix D). It is not considered to affect the floodplain sufficiently to require construction on embankment or require flood compensation measures.

The corridor crosses one of the major River Main tributaries, the Cloghmills Water and it is assumed that this crossing would require a bridge structure as with the existing A26 route. In addition, at the southern and northern ends, the corridor crosses one Rivers Agency designated and five undesignated minor watercourses. It is possible that the majority of these minor watercourses will require culverts with fish beds and otter ledges.

It is anticipated that the highway surface water run-off will generally be discharged into the associated River Main tributaries and watercourses. These outfalls would require pollution control provision as well as, almost certainly, attenuation facilities. Keeping the petrol interceptors above the flood level at outfalls at the northern and southern tie-ins, could be difficult and with any attenuation pond requiring excavations to be at least 1.0m below the outfall level, this could lead to ground water problems in these locations.

Emergency spillage ponds may also be required at the four proposed junctions for this corridor depending on traffic flows. These normally have a capacity of 50 cubic metres and are sited at the associated outfall. The possibility of groundwater problems at the Lisnasoo Road Junction is not anticipated to be significant.

The surface water drainage strategy for the scheme would need to be agreed with the Rivers Agency and the Environment and Heritage Service and this would be undertaken during the stage 2 assessment.

14.2.5 Public/ Private Utility Services

The majority of the existing public and private services known to be present within the study area appear to be limited to the existing A26 route corridor and the adjacent B93 (Killagan Road) and Old Frosses Road corridors.

This East-West Corridor is predominantly off-line to the east of the existing A26 corridor, however, it does follow close to the Old Frosses Road corridor for approximately 1.5km of its length and then utilises sections of the existing A26, B93 (Killagan Road) and B94 (Drumadoon Road) when it crosses over to the western side of the existing A26. The following existing services will potentially be affected:

- at the southern end for approximately 1.5km, the corridor proposes on-line widening of the existing A26 which carries longitudinal BT underground fibre-optic cables along this whole length;
- at this southern end, the corridor also intersects a Water Service water main and an 11kV overhead NIE cable;
- as the corridor moves off-line from the A26 towards Lisnasoo Road, it would follow parallel to the Old Frosses Road and intersects a further five 11kV overhead NIE cables;
- where the corridor crosses the Lisnasoo Road, it intersects a Water Service water main;
- as the corridor approaches the Cloghmills Water crossing, it intersects a further 11kV overhead NIE cable and two 33kV overhead NIE cables;
- at the northern end, where the corridor crosses over to the western side of the existing A26, it intersects a Water Service water main and BT underground fibre-optic cables in both the existing A26 and the B94 (Drumadoon Road). It also intersects two 11kV overhead NIE cables and a MV overhead NIE cable; and
- at the northern end tie-in, the proposed junction with the A44 (Drones Road) utilises a section of the existing A26 corridor which carries BT underground fibre-optic cables and a Water Service water main.

The level of impact on these existing utility services and the associated diversion requirements will be assessed and confirmed during the stage 2 assessment. An allowance has been included within the cost estimate for this corridor for utility service diversion.

14.2.6 Geotechnical Issues

For two-thirds of the corridor (the southern end), Corridor 6 traverses hummocky, drumlin terrain on the eastern valley side of the River Main. The drumlins are hillocks comprising over-consolidated, lodgement glacial till. This material is generally suitable for reuse in earthworks, and the cut slopes do not normally cause problems. Therefore, it is likely that if a balance of earthworks could be achieved for this corridor, the requirement for import or export of material would be minimal. This would be a significant cost saving in relation to the other corridors.

The initial 1.3km section for the corridor north of Glarryford would be essentially over glacial till, but this section also includes a minor valley 0.5km north of Glarryford, where poor ground conditions comprising alluvial and peaty soils are likely to be present.

Just south of the Frosses Trees section, the corridor would deviate to the east onto the rising valley side of the River Main. The corridor generally threads between the drumlins, but where the corridor passes through drumlins, cutting slopes of up to 20m deep could be required. Local areas of poor ground conditions may occur between the drumlins, where closed hollows have been infilled by alluvial deposits.

Where the corridor would cross the Clough Mills Water valley bottom, the geology largely comprises alluvial deposits.

After crossing Cloghmills Water, the corridor deviates to the west, crossing the existing A26. From this point the geology changes significantly in relation to the southern section. The northern section of the corridor crosses the valley bottom once more. This section, about 1.0km in length, would be required to be on embankment, crossing poor ground conditions comprising alluvial and peaty soils of variable thickness. Construction through this poor ground would be likely to require significant removal and disposal of soft, unsuitable material, or significant ground improvement or stabilisation.

14.2.7 Impact Upon Buildings and Property

Corridor 6 would be expected to have a limited impact upon residential properties or other buildings within the study area.

The corridor would pass close to a number of residential properties and further, more detailed, assessment at Stage 2 would be required to better assess the potential impact upon these properties. In addition, subject to confirmation of land ownership boundaries, some impact to land associated with other buildings may result.

14.2.8 Construction Issues

This corridor is predominantly off-line, and the majority of the route would be on relatively good engineering ground. Because of the drumlin nature of the southern section of the corridor, any alignment within this corridor would produce a high volume of both cut and fill material. The northern section of the corridor, however, would pass over poor quality land comprising peat and alluvial deposits. This section would be likely to require ground improvement. However, it is considered that through design, a balance of material would be achievable. In addition, moving earthworks around site would in general be an off-line procedure and not disrupt existing A26 traffic.

Several new structures would be required for this corridor, including numerous culverts. No significant construction issues are envisaged for these structures.

Traffic management is not considered a significant issue for this corridor as the majority of the route is off-line in relation to the existing A26. Nevertheless, towards the southern end of the scheme, traffic management may be an issue where the scheme could be more central to the existing route, and also around the junctions with the B94 (Drumadoon Road) and the B93 (Killagan Road).

14.3 Traffic Assessment

14.3.1 Introduction

The transport impact of this corridor has been assessed on a preliminary basis. At this coarse stage of assessment, there is little difference between any of the corridors assessed with respect to traffic movements

14.3.2 Traffic Flow Changes

An estimate of road network flows for this corridor has been made. Detailed alignment and junction layouts have not yet been determined, the forecast flows, at this stage, for an improved A26 are therefore broad estimations, and assume that virtually all existing A26 traffic would transfer onto the new A26 dual carriageway for at least part of their journey.

For this stage 1 assessment it has been assumed that flow patterns on side roads would remain as with the present case.

Table 14.1 shows the broadly estimated flows on each road link for 2012, the notional year of opening, and for 2027, the design year, with the new A26 improvement in place. It has been assumed that a nominal number of vehicles per day transfer from the new A26 dual carriageway onto the old A26, based upon the limited number of properties along the remaining Old A26 route.

The results of this early traffic assessment are presented graphically in Figure 14.1 (overleaf).

It should be noted that the flows given in Table 14.1 are preliminary estimates. Origin-destination data was unavailable at the time of this study, and thus detailed estimating of re-routing of traffic was not possible. It is expected that this work should be undertaken at stage 2 should this corridor be progressed.

Figure 14.1: Traffic Flows East-West Corridor

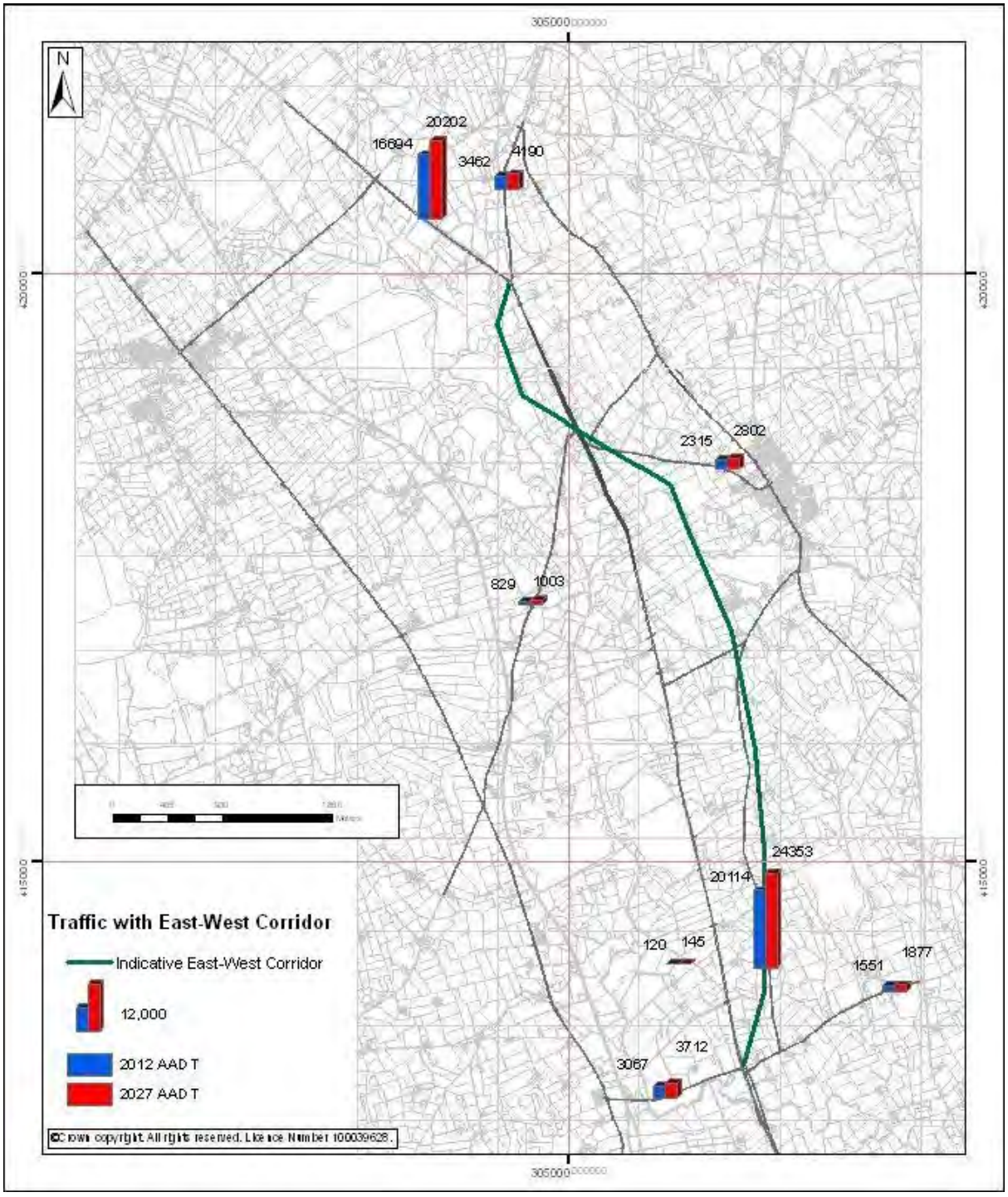


Table 14.1: Estimated Forecast Flows with A26 Improvement in place

Road	Direction of Flow	2012 Year of Opening AADT	2027 AADT
New A26 Improvement, north of B64	**northbound**	**10,021**	**12,133**
	southbound	**10,093**	**12,220**
(Old A26) Frosses Road	northbound	60	72
	southbound	60	73
B64 (Station Road), west of A26	*eastbound*	1,524	1,844
	westbound	1,543	1,868
B64 (Springmount Road) east of A26	*eastbound*	778	942
	westbound	773	935
Lisnasoo Road, east of A26	*eastbound*	1,076	1,303
	westbound	1,033	1,250
B93 (Killagan Road), west of A26	*northbound*	397	480
	southbound	432	523
B94 (Drumadoon Road), east of A26	*eastbound*	1,184	1,433
	westbound	1,131	1,369
A44 (Drones Road), north of A26	*northbound*	1,679	2,032
	southbound	1,783	2,158

14.4 Environment Objective

The potential environmental issues associated with the development of the East-West Corridor reflect those encountered by Eastern 1 Corridor (refer to Section 13.4) until just north of the Cloghmills Water crossing. From this point, the East-West Corridor deviates westwards and crosses the existing A26 immediately to the north of the existing A26/ B94 (Drumadonn Road) junction before gently curving to the north across a small length of the eastern edge of the River Main floodplain before its 'tie-in' with the A44 (Drones Road) junction.

There are approximately 35 and 57 residential dwellings within 200m and 300m of this new road corridor which would be sensitive to both new and increased levels of road traffic noise and vehicle emissions. This corridor would increase ambient noise levels and reduce local air quality through increases in vehicle emissions.

The landscape along this new road corridor comprises a mixture of gently to moderately undulating drumlin topography and good quality agricultural land to the east of the existing A26 to low-lying and generally flat areas of floodplain. Sections of this new corridor to both the east and west of the existing A26 would be constructed on embankment to achieve 1:100 year flood immunity levels and would alter the profile of this part of the floodplain, creating an artificial feature that is visually prominent in both immediate and certain longer distance views, particularly from elevated positions to within the study area.

The setting and appearance of Drumadoon House in the local landscape, a listed building, located immediately adjacent to the southbound carriageway of the existing A26 at the junction of the existing A26/ B94 would be affected by this corridor as it passes across the existing A26. Furthermore, there is the potential for unknown, buried or in-situ archaeological remains to be directly disturbed or damaged during road construction, particularly in the areas of raised bog and floodplain and fen mire to the west of the existing A26.

This corridor would traverse approximately 800m of the 1:100 year floodplain associated with the River Main and Cloghmills Water and cross a small number of drainage lines flowing east to west across the proposed corridor to the River Main. Whilst, there is a flooding risk associated with the development of the offline section of this new corridor, it is considered to be low with the potential loss of flood storage capacity estimated to be approximately 5.8 ha. The thin belts of riparian habitat straddling the bankside areas of local watercourses crossed by this corridor

would be directly affected by road construction works through the loss and removal of vegetation. Furthermore, pollution incidents occurring along or in the vicinity of local watercourses crossed by this corridor would have the potential to adversely impact on local water quality and aquatic biota.

The development of this corridor is unlikely to impact on the hydrological processes connecting the Main Valley Bogs SAC, namely the Caldanagh and Dunloy bogs in the north with the Frosses bog in the south, however, further work would be required during the next stage of the design development process to evaluate this issue in more detail. The alignment of this corridor also tends to skirt a small section of the eastern edge of the River Main floodplain. Habitats of high ecological value that would be affected by the offline section of this corridor include raised bog and floodplain and fen mire which are known to support populations of protected species. The results of recent wintering surveys recorded two bird species listed under Schedule 1 of the *Wildlife (Northern Ireland) Order 1985*, fieldfare and kingfisher.

A series of mitigation measures would be identified as part of the Stage 2 Scheme Assessment work in order to minimise the potential for any adverse environmental impacts associated with the development of the East-West Corridor. Mitigation measures for East-West Corridor would be similar to those detailed for the Eastern 1 Corridor.

14.5 Safety Objective

14.5.1 Accidents

It is likely that improving the existing A26 carriageway from S2 to a D2AP carriageway would improve the safety performance of the A26. The congested nature of the existing route, with the lack of safe overtaking opportunities, currently results in a high proportion of shunt-type accidents. Improving the design standard of the route and the capacity is likely to lead to the A26 becoming a much safer, high-speed transport corridor.

Specifically, this largely off-line corridor would take the heavy volume of through-traffic away from the existing corridor, which serves a number of residential properties and farm accesses. Therefore, this corridor would be likely to reduce the potential for accidents associated with the following:

- Pedestrians. There would be little requirement for pedestrians to use the Corridor 6 transport corridor as it would not pass through any residential areas. Pedestrians would be far more likely to utilise the existing A26 corridor, which would have a greatly reduced throughput of traffic and would become a more pleasant pedestrian environment; and
- Vehicles using private direct accesses off the main road. The standard of the improved A26 highway would not permit direct private access onto the main carriageway. Access would be routed via the proposed key junctions. This will create a safer environment for vehicles entering and leaving the route.

Given the early stage of design for this study, it has not been possible to undertake a quantitative analysis to assess accident rates for the proposed route. However, the above qualitative assessment suggests accident rates for the road should reduce significantly as a result of this corridor being implemented.

14.5.2 Security

Given the rural nature of the A26 study area, security is unlikely to be a factor in deciding upon corridor preference. Therefore no assessment of security has been undertaken at this stage of assessment.

14.6 Economy Objective

14.6.1 Cost-Estimate

The cost- estimate for the East - West Corridor has been based on the following information:

- 5.6 km of off-line dual carriageway;

- 1.5 km of dual carriageway based along the existing route;
- 2.2 km of access roads to dwellings;
- 1.0 km of feeder roads;
- 3 nr overbridges;
- 2 nr small river crossings; and
- Piled foundations through 0.9 km of peat bog. (An alternative estimate, based on excavation of the peat material in lieu of piling, was also assessed, but this construction method was assessed to be a higher cost, therefore a piling solution has been included in this stage 1 cost-estimate. This, however, will be reviewed during the stage 2 assessment).

The following earthworks quantities have been estimated and priced:

- Earthworks cut volume 550,596 m^3;
- Earthworks fill volume 173,828 m^3; and
- Topsoil volume 82,346 m^3.

Given the early stage in the design process for this assessment, it was necessary to make a number of assumptions to develop a stage 1 cost estimate. These assumptions are listed below:

- agricultural land quality is relatively poor to the west of the existing A26 and land cost has therefore been assumed as £15,000 per acre (as advised by VLA);
- given the relatively poor land quality to the west of the A26, farm or property severance is likely to be limited. Compensation costs have been assumed at 20% of the scheme cost;
- All roads require temporary fencing;
- All roads require boundary fencing;
- Safety barrier allowed for the full length of the central reserve and an allowance at junctions;
- All cut material is to be reused on site;
- Raised rib edge line both sides; and
- 475 mm thick road construction.

The total estimated cost of this corridor, including a 22% optimism bias (see Section 8.4.2) is **£53,281,000**. A summary of the cost-estimate is provided in Table 14.2

Table 14.2: Cost-estimate for East - West Corridor

Cost Item	Cost (£) - 2006 Q4	% of cost
Preliminaries	£ 4,461,584.44	9.64%
Site Clearance	£ 99,006.45	0.21%
Fencing & env. barriers	£ 393,140.90	0.85%
Safety fences	£ 696,954.61	1.51%
Drainage	£ 2,273,301.94	4.91%
Earthworks	£ 9,617,761.52	20.78%
Pavements	£ 6,847,100.26	14.80%
Kerbs & footpaths	£ 461,036.25	1.00%
Traffic signs & markings	£ 424,224.20	0.92%
Street lighting	£ 375,451.39	0.81%
Electrical works	£ 15,259.64	0.03%
Landscaping	£ 578,276.39	1.25%
Overbridges	£ 1,500,000.00	3.24%
River crossings	£ 400,000.00	0.86%
Accommodation works	£ 944,062.47	2.04%
Statutory bodies	£ 1,123,678.26	2.43%
Sub total	**£ 30,210,838.72**	65.29%
Contractor's O&P @ 10%	£ 3,021,083.87	6.53%
Sub total	**£ 33,231,922.59**	71.82%
Land costs	£ 712,877.75	1.54%
Compensation costs	£ 6,646,384.52	14.36%
Sub total	**£ 40,591,184.87**	87.72%
Preparation (9%)	£ 3,653,206.64	7.89%
Supervision (5%)	£ 2,029,559.24	4.39%
Sub total	**£ 46,273,950.75**	100.00%
Optimism Bias (22%)	£ 10,180,269.16	22.00%
TOTAL ESTIMATED COST (2006 Q4)	**£ 56,454,219.91**	
TOTAL ESTIMATED COST (2005 Q1 @ - 5.62%)	**£ 53,281,492.75**	

14.6.2 Risk

A risk assessment was carried out for this corridor. The methodology adopted is presented in section 8.4.2.

An early risk register was developed for this assessment. The full risk register can be found in Appendix E.

The following is a summary of what are considered to be the most significant risks to this corridor:

- scheme costs could exceed the budget. This could be as a result of initial under-estimation or error, or unexpectedly high construction inflation. The implications of this could range from needing to seek additional funding, or result in the scheme being suspended in favour of cheaper schemes;
- geotechnical risks exist for this corridor as the ground conditions might not be as good as anticipated, resulting in additional costs for the scheme. In addition, poor ground conditions are known to exist along the northern section of the corridor, to the west of the existing A26;

- environmental risks exist for this corridor. Along the southern section of the corridor, to the east of the existing A26, there are badgers present along the corridor and other flora and fauna issues associated with rural agricultural land; and
- farm severance would be likely to be a significant issue with this corridor, and political pressure opposing this corridor is likely.

14.6.3 Public Accounts

Based upon a coarse assessment of impact to public accounts, Table 14.3 summarises the public accounts for the East-West Corridor. An explanation of the composition of the table is provided in section 8.4.4.

Table 14.3: Public Accounts Table for East-West Corridor

	All Modes Total	**Road**	**Bus**
Local Government Funding			
Revenue	0	0	0
Operating Costs	0	0	0
Investment Costs	0	0	0
Developer & Other Contributions	0	0	0
Grant/ Subsidy Payments	0	0	0
NET IMPACT	**0**	0	0
Central Government Funding			
Revenue	0	0	0
Operating Costs	5,661	5,661	0
Investment Costs	37,305	37,305	0
Developer & Other Contributions	0	0	0
Grant/ Subsidy Payments	0	0	0
Indirect Tax Revenue	-3,747	-3,747	0
NET IMPACT	**39,319**	**39,319**	0
TOTAL Present Value of Costs (PVC)	**39,319**		

14.6.4 Transport Economic Efficiency

A summary of the coarse transport economic efficiency assessment is provided below in Table 14.4.

Table 14.4: Economic Efficiency of the Transport System (TEE) for the East-West Corridor

	All Modes Total	**Road**		**Bus**
Consumers				
User Benefits (£000s)				
Personal Travel				
Travel Time	35,100	35,100		0
Vehicle Operating Costs	-2,443	-2,443		0
User Charges	0	0		0
During Construction & Maintenance	-257	-257		0
NET CONSUMER BENEFITS	**32,400**	32,400		0
Business				
User Benefits		Personal	Freight	Passengers
Travel Time	53,276	38,794	14,482	0
Vehicle Operating Costs	-3,040	-117	-2923	0
User Charges	0	0	0	0
During Construction & Maintenance	-535	-388	-147	0
Sub Total	**49,701**	38,289	11,412	0
Private Sector Provider Impacts				
Revenue	0			0
Operating Costs	0			0
Investment Costs	0			0
Grant/ Subsidy	0			0
Sub Total	0			0
Other Business Impacts				
Developer Contributions	0	0		0
NET BUSINESS IMPACTS	**49,701**			
TOTAL (£000)				
Present Value of Transport Economic Efficiency Benefits	**82,101**			

Table 14.5 provides an overall summary of the economic performance of the East-West Corridor.

Table 14.5: Summary of Monetised Costs and Benefits for East-West Corridor

Cost or Benefit	Sum (£000)	Comments
Consumer User Benefits	32,400	
Business User benefits	49,701	
Private sector Provider Impacts	0	
Other Business Impacts	0	
Accident Benefits	0	
Carbon Benefits	-532	
Present Value of Benefits (PVB)	**81,569**	
Local Government Funding	0	
Central Government Funding	39,219	
Present Value of Costs (PVC)	**39,219**	
Overall Impacts		
Net Present Value (NPV)	**42,350**	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	**2.080**	BCR=PVB/PVC

An explanation of the composition of tables 14.4 and 14.5 is provided in section 8.4.5.

It can be seen from Table 14.5 that the results of the coarse economic assessment would indicate that the East-West Corridor would be likely to deliver a positive benefit to cost ratio (BCR) of 2.08, with a net present value (NPV) of over £42million.

However, these results should be read in conjunction with the assumptions and limitations listed in Section 8.4.5.

14.6.5 Reliability

Reliability has not been assessed for this stage 1 assessment, as discussed in section 8.4.3.

14.6.6 Wider Economic Impacts

The wider economic impacts objective has not been assessed for this stage 1 assessment. See section 8.5 for details.

14.7 Accessibility Objective

The accessibility objective has not been assessed for this stage 1 assessment. See section 8.5 for details.

14.8 Integration Objective

14.8.1 Transport Interchange

The transport interchange sub-objective has not been assessed for this stage 1 assessment. See section 8.6.1 for details.

14.8.2 Land Use Policy

The following land use policies would impact on Corridor 3:

- Conserving Peatlands Statement – The Government has produced a policy statement on conserving peatlands in Northern Ireland. The policy is currently under review; however, the emerging policy is likely to have a greater emphasis on maintaining, enhancing and restoring peatland habitat, particularly for lowland raised bog, blanket bog and fen habitats. Proposed new elements of the policy also refer to maintaining and restoring the role of peatland in maintaining the hydrological integrity of the river basins. The northern section of this corridor passes through peatland area. The section of the corridor would therefore be in opposition with the objectives of a new and revised peatlands policy statement; and
- River Conservation Strategy – This corridor could have a minor impact on the River Main, its tributaries, and its floodplain, and therefore would not comply with the objectives of the river conservation strategy, to maintain and enhance the ecological integrity and biodiversity of rivers. However, the area over which this corridor contravenes the policy is limited.

14.8.3 Other Government Policies

The other Government policies that would also affect this corridor are listed as follows:

- Conservation (Natural Habitats) Regulations Northern Ireland 1995;
- Conservation of Natural Habitats & Wild Flora & Fauna Directive (92/43/EEC) as transposed by the Conservation (Natural Habitats) Regulations Northern Ireland 1995;
- Draft Northern Area Plan 2010-2016 – This corridor is likely to conflict with the environmental polices proposed within the Draft Northern Area Plan 2010-2016;
- Drainage (EIA) Regulations (Northern Ireland) 2001 – Under these regulations, the Department of Agriculture and Rural Development are required to consider whether any proposed drainage works are likely to have significant effects on the environment. It is likely that this corridor could have a minor adverse impact on the hydrology and drainage conditions of the Main Valley Bogs SAC at the northern end of the corridor;
- The Fisheries Act 1966 as amended 2001 – Under this Act, it is an offence to discharge deleterious matter into waters, which impact on fish, or spawning grounds. This western corridor intersects the River Main and a number of its tributaries thus requiring a number of potential crossings. There is the potential during construction and operation, for highway run-off to enter and pollute the River Main and its tributaries, particularly at the northern end of the corridor. This would also fall under the Water Act (NI) 1999 and the Groundwater Regulations (NI) 1998.
- Planning Policy Statement 15 – This states that new development should ensure that it is not exposed to the direct threat of flooding, nor should it increase flooding elsewhere. At the northern end of the route, this corridor would traverse areas susceptible to flooding.

14.9 Corridor 6 - Assessment Summary

14.9.1 Overview

The East-West Corridor would provide the opportunity to deliver an almost wholly off-line solution to dualling the A26, which would allow construction with a minimal impact to existing traffic. It is considered that a dualling solution could be delivered in accordance with design standards with no obvious departures from standard required.

A major benefit of such an off-line solution would be that traffic management issues, during construction, would be minimised, with the vast majority of construction being away from the existing A26. However, as the majority of the route would be off-line new construction, this corridor, along with Corridors 1 and 5, would be likely to require the largest amount of land-take.

Ground conditions for this corridor are considered good for approximately two-thirds of the length. This good ground is generally understood to comprise glacial till which is generally suitable for reuse in earthworks. It is believed that an alignment within this corridor could be designed to balance the earthworks requirements and, therefore, import and export of earthworks should be minimal for this corridor.

The East-West Corridor largely routes away from residential properties, but there could be a perceived disbenefit associated with the utilisation of good quality farm land for road construction and there would be disruption and severance issues to the farms affected along the corridor.

This corridor could potentially directly impact upon a small number of residential properties.

14.9.2 Environment

The principal environmental issues associated with the development of East-West Corridor would reflect those encountered by Eastern 1 Corridor (refer to Section 13) up until just north of the Cloghmills Water crossing. From this point to the northern 'tie-in' with the A44 (Drones Road) junction the key environmental issues for consideration would be attributed to:

- changes to the ambient noise and air quality conditions of residential properties, agricultural land holdings and sensitive ecological habitats situated along and in the vicinity of the offline section of this corridor;
- changes and modification to the local landscape character and visual prominence of the new road corridor skirting the eastern edge of the floodplain in both immediate and long distance viewpoints;
- new crossing of the existing A26 and the alteration to the setting and appearance of Drumadoon House, a listed building, located a short distance to the south of the proposed alignment of the corridor adjacent to the B94 and any potential unknown, buried or in-situ archaeological remains in the areas of raised bog and floodplain and fen mire;
- incursion into the 1:100 year floodplain of the River Main and loss of available flood storage capacity;
- alteration of overland drainage flows and patterns, and increased risk of pollution to local watercourses reducing water quality; and
- direct loss of raised bog and floodplain and fen mire habitats of interest to a variety of protected species and disruption to surface and groundwater flows and connections the Caldanagh and Dunloy Bogs ASSI in the north with the Frosses Bog ASSI in the south which form the Main Valley Bogs SAC, a European protected site.

14.9.3 Safety

It is considered that the East-West Corridor would improve traffic flow and provide a high speed transport corridor. The route improvement would remove private access onto the route, channelling all traffic turning movements to the grade separated junctions. Therefore the highway improvement would remove the current problems of poor overtaking opportunities; vehicles forming platoons behind slow-moving vehicles; and uncontrolled traffic movements on and off the carriageway (through private accesses). Therefore the safety performance of the corridor should significantly improve in relation to the current situation.

However, improvements in road safety would be expected with all the corridors.

14.9.4 Economy

The estimated cost of the East-West Corridor is £53,281,000 (at 2005 Q1 prices). This cost-estimate includes a 22% optimism bias, but no risk allowance.

The economic performance of the East-West Corridor is as follows:

- NPV: £42,350,000
- BCR: 2.08

14.9.5 Accessibility

No assessment of accessibility has been undertaken for this stage 1 assessment.

14.9.6 Integration

This corridor would be likely to contravene the following land use and Government policies to a moderate extent:

- Conserving Peatlands Statement;
- River Conservation Strategy;
- Planning Policy Statement 2 (PPS 2);
- Conservation (Natural Habitats) Regulations Northern Ireland 1995;
- Draft Northern Area Plan 2010-2016;
- Drainage (EIA) Regulations (Northern Ireland) 2001;
- The Fisheries Act 1966 as amended 2001; and
- Planning Policy Statement 15.

14.9.7 Assessment Summary Table

An assessment summary table for the east-west corridor (Corridor 6) is presented in Appendix F.

15 Corridor Comparison

15.1 Introduction

The corridors assessed as part of this study have included the following:

- Corridor 1: Western 2;
- Corridor 2: Western 5;
- Corridor 3: Western 6;
- Corridor 4: Central;
- Corridor 5: Eastern 1; and
- Corridor 6: East-West.

Preliminary assessments of these corridors have been undertaken in terms of the Government's over-aching objectives of environment, economics, safety, accessibility and integration. In addition, assessment has been made against the criteria of engineering issues, traffic issues and risk.

A comparison of the assessments is provided in this Chapter, with a recommendation over which corridors should be taken forward for Stage 2 assessment.

15.2 Comparison of Engineering Issues

It is considered that all corridors could be designed in accordance with the DMRB to a design speed of 120kph without the need for departures from standards.

In terms of land-take, the off-line solutions would require significantly more land than the more central on-line biased solutions. Therefore Corridors 1, 5 and 6 would be likely to require the maximum landtake, with Corridors 3 and 4 require the minimum.

Junction strategy has not been decided at this stage of assessment. However, for assessment purposes the junction strategy assessed included utilisation of compact grade separated junctions for all side roads, with the exception of the junction with the A44 (Drones Road), which was proposed as an at-grade roundabout. Corridor 1 would require only two compact grade separated junctions, as no junction with Lisnasoo Road would be required for this corridor. All other corridors would require a junction with Lisnasoo Road.

Corridor 1 would have a significant impact upon the River Main floodplain. This would require a significant length (2.5m approximately) of the corridor to be designed on an embankment of between 2.0m and 2.5m high. This would result in this corridor requiring a significant amount of imported fill material and potential increase to the construction programme for consolidation of the embankments. In addition, this corridor would require significant additional land to be provided as compensation for the loss of floodplain, to provide additional storage capacity to the existing floodplain. Corridor 2 would have some impact upon the floodplain, but of a substantially more limited extent than for Corridor 1.

Corridors 3 and 4 are both predominantly more central to the existing route and would affect existing utility services to the greatest extent, as the existing A26 has both major water mains and BT fibre-optic cables running down the verges. However, all corridors would impact upon services (particularly overhead electricity) to some extent.

Existing ground conditions vary significantly between the corridors. Corridor 1, and to a lesser degree Corridor 2, pass over geology comprising alluvial deposits overlain by layers of peat. It has been assessed that these corridors would either require the removal and replacement of the upper layers, or the implementation of significant ground improvement methods. Piling has been assumed for costing purposes. Corridors 5 and 6 route to the east of the existing A26, and this area benefits from markedly different geology, comprising over consolidated glacial till, which is largely good engineering material, with isolated pockets of poor ground. These corridors would therefore benefit from the opportunity to use excavated material as fill material

elsewhere along the corridor maximising the opportunity to achieve a balance between cut and fill. Corridors 3 and 4, being more central based schemes, would experience a mixture of the two differing geologies discussed.

Traffic management will be a significant engineering issue with the more central corridors of Corridors 3 and 4. It is anticipated that significant delays during construction would be encountered by road users, and this could also have an impact upon the construction programme.

The corridor preference in terms of engineering issues would be for Corridor 5 and Eastern 1.

15.3 Comparison of Traffic Issues

The traffic assessment for the stage 1 study has been limited to a strategic overview and has included broad assumptions which are relevant to all three corridors.

The study has shown that the capacity of the existing A26 would be exceeded after 2012 (the notional year of opening for the scheme). The study has also demonstrated that a dualling scheme is justified in terms of forecast traffic.

In addition, it is likely that accident rates would be reduced for all corridors.

There is no preference for corridor in terms of traffic.

15.4 Comparison of NATA Objectives

15.4.1 Environment Objective

The rural nature of the study area, and the small number of residential properties means that noise and air quality issues are not likely to be a major factor in determining corridor selection. However, noise and air quality issues are likely to be most significant on the more central corridors (Corridors 3 and 4), as these corridors have the greatest numbers of residential properties in close proximity.

There are a range of historic resources within the study area. The majority exist adjacent to the eastern corridors (Corridors 5 and 6), but these are unlikely to be directly affected by a specific route within these corridors. The more central corridors (Corridors 3 and 4) have a listed building, Drumadoon House, adjacent to them.

Biodiversity is a major issue with Corridor 1and is one of the most significant issues associated with this corridor. This corridor has the potential to impact upon a SAC complex, two ASSIs, and several SLINCIs. The SAC complex is the most highly designated feature within the corridor, and although it would be possible to avoid directly passing through any of the bogs associated with this feature, concern exists that the hydrological connectivity throughout the SAC could be affected by the Western 2 Corridor, resulting in the drying out of the Bogs. This corridor would impact upon a greater and more diverse range of habitats, consequently affecting a greater range of protected species, both flora and fauna. Biodiversity along the eastern and more central corridors would be affected, but this is not considered a significant constraint.

Water quality within the River Main valley has the potential to be reduced by all corridors, however, the most significant danger exists with Corridors 1 and 2. Impact to the flood plain is a major concern for the Western 2 Corridor and significant flood compensation measures would be required for this corridor.

Little differences exist in the journey ambience and physical fitness for the corridors. All three corridors are likely to provide the road user with a pleasant driving experience. However, during construction, traffic delays associated with the more central corridors (Corridors 3 and 4, and to a lesser extent Corridor 2) would result in a significant negative driving experience.

The environmental preferences would be for a more central on-line widening solution (Corridors 2, 3 or 4).

15.4.2 Safety Objective

The existing A26 has a relatively poor accident record.

For the proposed dualling scheme, under normal highway operating conditions, it is considered that all corridors would deliver a significantly positive safety benefit in relation to the existing A26 route.

However, safety during construction is likely to be significantly better for the largely off-line corridors, Corridors 1, 5 and 6.

The safety preference would be for corridors 1, 5 and 6, but all corridors are likely to perform well for overall.

15.4.3 Economy Objective

A summary of the cost estimates for the corridors is as follows.

Table 15.1: Summary of Economic Criteria

Cost Item	Corridor 1: Western 2	Corridor 2: Western 5	Corridor 3: Western 6	Corridor 4: Central	Corridor 5: Eastern 1	Corridor 6: East-West
Cost Estimate (2005Q1)	£54.3M	£52.1M	£51.6M	£48.7M	£46.1M	£52.1M
Net Present Value (NPV) (2002)	£35.7M	£44.5M	£43.6M	£48.2M	£43.8M	£42.4M
Benefit to Cost Ratio (BCR)	1.90	2.18	2.19	2.39	2.30	2.08

The range of cost estimates for the corridors varies from £46.1 million to £54.3 million, with the least expensive and most expensive corridors being corridors 5 and 1, respectively.

Corridor 1 is the most expensive corridor largely because of the significant amount of imported fill material that would be required to form an embankment through the floodplain, and the ground improvement works and import of fill material to replace the poor ground (peat) that would need to be removed before construction.

The least expensive corridor is Corridor 5 (Eastern 1), where traffic management costs are low, and the excavated material could be used as fill material elsewhere on the scheme. However, land and compensation costs for the eastern corridors has been assessed as significantly higher than for the central and western corridors. This is because the land is high quality farm land and severance is likely to be a major issue.

In terms of economic performance over a 60 year period, the best performing corridor was Corridor 4, Central, with a benefit to cost ratio (BCR) of 2.39 and a net present value (NPV) of over £48 million. However, there is little difference in economic performance between the corridors.

15.4.4 Accessibility Objective

Accessibility has not been assessed for this stage 1 assessment.

15.4.5 Integration Objective

The six corridors under consideration would all contravene land us policy and other Government policies to some extent. However, Corridor 1 is likely to be the worst performing corridor under this objective as it would, most significantly, contravene policies concerning:

- development on peatland;
- development on floodplain; and
- impact upon conservation.

Corridors 5 and 6 would potentially contravene policies concerning development on agricultural land and ecology.

Corridors 3 and 4 would be likely to have the least significant impact under the integration objective.

15.5 Summary of Corridor Comparison

15.5.1 Introduction

The section summarises the corridor comparison and recommends which corridors should be rejected and which should be taken forward to Stage 2 assessment, for further, more detailed assessment.

15.5.2 Recommended Corridors to be Rejected

15.5.2.1 Corridor 1: Western 2

Corridor 1 performs well in terms of impact to existing road users because it is an off-line solution, therefore traffic management would be minimal and safety would be expected to be major beneficial. However, because of the significant impact to the River Main flood plain, and the extent of embankment required, a significant volume of imported fill material would be required and consolidation of embankments would impact upon construction programming. Environmentally, Corridor 1 would be expected to have a major adverse impact, and has been assessed as having the significantly the greatest detrimental impact upon the environment of all the corridors assessed.

Corridor 1 would be the most expensive of the corridors and delivers the worst performance of the corridors in terms of economy, but does deliver a positive BCR and NPV.

In terms of integration, Corridor 1 would have the largest negative impact upon existing planning policy and Government policies of all the corridors.

In terms of comparing with the other corridors, Corridor 1 performs the worst in terms of three of the five NATA objectives: environment, economy and integration. The greatest concern, however, with Corridor 1 is with the potential impact upon the environment. For these reasons, it is recommended that Corridor 1 is not carried forward to stage 2.

15.5.3 Recommended Corridors to be taken to Stage 2 Assessment

15.5.3.1 Corridor 2: Western 5

Corridor 2 consists of half more central to the existing corridor and half off-line from the existing corridor. It would therefore not deliver traffic management benefits to existing road users, and safety during construction would be an issue for consideration. Some impacts to the River Main flood plain would be impacted upon, but this would be of a significantly reduced scale to Corridor 1. Environmentally, Corridor 2 would be expected to have a moderate to minor adverse impact as some detrimental impacts would occur as a result of widening the existing A26, and where the corridor went off-line at the northern end of the scheme.

Corridor 2 is second most expensive corridor, but delivers the second best performance in terms of economy. Like all the other corridors, Corridor 2 delivers a positive BCR and NPV.

In terms of integration, Corridor 2 would have a minor negative to neutral impact upon existing planning policy and Government policies.

In terms of comparing with the other corridors, Corridor 2 performs reasonably well in all the NATA objectives assessed: environment, economy, safety and integration. At this stage of assessment, Corridor 2 would appear to warrant further consideration, and it is therefore recommended that Corridor 2 is carried forward to stage 2 for more detailed assessment.

15.5.3.2 Corridor 3: Western 6

Corridor 3 is an almost wholly central corridor. It is therefore considered that significant traffic management would be required during construction and significant delays to existing road users would be expected. Safety during construction would be an issue for consideration.

Environmentally, Corridor 3 would be expected to have a minor adverse impact as limited detrimental impacts would be expected as a result of widening the existing A26.

Corridor 3 would be expected to have a mid range construction cost, when compared with the other corridors, and would provide the same level of economic benefit as Corridor 2. Like all the other corridors, Corridor 3 delivers a positive BCR and NPV.

In terms of integration, Corridor 3 would have a minor negative to neutral impact upon existing planning policy and Government policies.

In terms of comparing with the other corridors, Corridor 3 performs reasonably well in all the NATA objectives assessed: environment, economy, safety and integration. At this stage of assessment, Corridor 3 would appear to warrant further consideration, and it is therefore recommended that Corridor 3 is carried forward to stage 2 for more detailed assessment.

15.5.3.3 Corridor 4: Central

Corridor 4 most closely represents an on-line corridor. Significant traffic management would be required during construction and significant delays to existing road users would be expected. Safety during construction would be an issue for consideration. Environmentally, Corridor 4 would be expected to have a minor adverse impact as limited detrimental impacts would be expected as a result of widening the existing A26.

Corridor 4 is the second cheapest corridor, and would provide the best level of economic benefit of all the corridors considered. Like all the other corridors, Corridor 4 delivers a positive BCR and NPV.

In terms of integration, Corridor 4 would have a neutral impact upon existing planning policy and Government policies.

In terms of comparing with the other corridors, Corridor 4 performs the best in terms of the following NATA objectives assessed: environment, economy, and integration. At this stage of assessment, Corridor 4 would appear to be the best performing corridor and would warrant further, more detailed, consideration at stage 2.

15.5.3.4 Corridor 5: Eastern 1

As with Corridors 1 and 6, Corridor 5 performs well in terms of impact to existing road users because it is essentially an off-line corridor, therefore traffic management would be minimal and impact upon safety would be expected to be of major benefit to the corridor. However, the corridor passes through good quality agricultural land and the impact of severance to farms is likely to be severe. Additionally, the landscape through which Corridor 5 is proposed to pass is considered visually appealing, and is assessed as having a high quality agricultural biodiversity. Environmentally, therefore, Corridor 5 has been assessed to have a moderate adverse impact.

Corridor 5 would be the least expensive of the corridors and delivers good performance in terms of economy. The corridor would deliver a positive BCR and NPV.

In terms of integration, Corridor 5 would have the moderate to minor negative impact upon existing planning policy and Government policies.

As a result of feedback obtained from the public, Corridor 5 would be expected to be opposed by the local community, as it would impact upon the farming community.

In terms of comparing with the other corridors, Corridor 5 performs poorly in terms of impact to environment and integration. However, at this stage of assessment, Corridor 5 would appear to perform reasonably well for economy. It is therefore considered that not enough information is available for Corridor 5 to warrant rejection, so it is recommended that the corridor is carried forward to stage 2 for more detailed assessment.

15.5.3.5 Corridor 6: East-West

As with Corridors 1 and 5, Corridor 6 performs well in terms of impact to existing road users because it is essentially an off-line corridor, therefore traffic management would be minimal and impact upon safety would be expected to be of major benefit to the corridor. However, the corridor passes through good quality agricultural land and the impact of severance to farms is

likely to be severe. Additionally, the landscape through which Corridor 6 is proposed to pass is considered visually appealing, and is assessed as having a high quality agricultural biodiversity. Environmentally, therefore, Corridor 6 has been assed to have a moderate adverse impact.

Corridor 6 would be the least expensive of the corridors and delivers good performance in terms of economy. The corridor would deliver a positive BCR and NPV.

In terms of integration, Corridor 6 would have the moderate to minor negative impact upon existing planning policy and Government policies.

As a result of feedback obtained from the public, Corridor 6 would be expected to be opposed by the local community, as it would impact upon the farming community.

In terms of comparing with the other corridors, Corridor 6 performs poorly in terms of impact to environment, integration and economy. However, at this stage of assessment, it is therefore considered that not enough information is available for Corridor 6 to warrant rejection, so it is recommended that the corridor is carried forward to stage 2 for more detailed assessment.

16 Summary and Recommendations

16.1 Background and Basis of Study

In March 2005, the *Regional Strategic Transport Network Transport Plan 2015* (RSTN TP) was published. The RSTN TP included the 'A26 Glarryford - A44 Junction (upgrade to dual-carriageway)' in the 5 to 10-year Forward Planning Schedule.

This stage 1 scheme assessment provides a 'corridor' appraisal for the route and identifies the environmental, engineering, economic, and traffic advantages, disadvantages and constraints associated with broadly defined improvement strategies. The study was undertaken in accordance with the *Design Manual for Roads and Bridges* (DMRB), *TD 37/93 – Scheme Assessment Reporting*, and the *New Approach to Appraisal* (NATA), basing the appraisal on the Government's 5 over-arching objectives of environment, safety, economy, accessibility, and integration.

The assessment of each of these objectives was undertaken using guidance set out in the Department for Transport's (DfT) web-based *Transport Analysis Guidance* (WebTAG).

16.2 Baseline Conditions

The section of the A26 road under consideration is the 7km section between Glarryford and the A44 (Drones Road). The existing road is of single carriageway construction with five side road priority junctions within the study area.

The existing road is mainly derestricted (60mph), but a short section around the A26/ B94 (Drumadoon Road) junction is subject to a 50mph speed limit. The geometry of the existing road is below standard for a design speed of 100kph and would require significant improvement to meet the required design speed of 120kph for an improved road.

There are limited engineering constraints within the study area. There are six bridges, three of which are river crossings, and three are small culvert-type structures. All structures are in reasonable condition. There are a limited number of utility services running along the existing road corridor, including electricity, water and telecommunications.

The geology to the west of the existing A26 largely comprises alluvial and peaty soils with discrete areas of sand and gravels. The ground conditions are considered poor in this area and substantial ground improvement would be required in this area. To the east of the existing A26, however, the ground conditions comprise over consolidated, lodgement glacial till. This is good quality material which would be suitable for road construction.

There are some significant environmental constraints associated with the study corridor. In ecology terms, there are two Areas of Specific Scientific Interest (ASSIs) to the west of the existing A26 which form part of the River Main Special Area for Conservation (SAC). This is a European designated site for nature conservation. There are also a range of protected species associated with the River Main valley. The River Main valley provides for a substantial 1:100 year floodplain, which lies to the west of the existing A26 route.

Drumadoon House is the only listed building within the study area.

16.3 Traffic Assessment

A traffic capacity assessment was carried out for the existing A26. This assessment was undertaken for the base year (2006), the year of opening (2012), and the design year (2027). The results of this assessment are presented in table 16.1 (overleaf).

It can be seen that in a do-nothing scenario the existing A26 would exceed its operational capacity within the next decade.

Table 16.1: Route Capacity Assessment Based upon Congestion Reference Flow (CRF)

Year	Forecast Flows (AADT)	Estimated CRF	Flow as % of CRF
2006	18451	21009	88%
2012	20174	21009	96%
2027	24413	21009	116%

An assessment to determine the appropriate carriageway standard was undertaken using the CRF assessment method. Carriageway standards assessed included:

- wide single carriageway (WS2), and
- dual carriageway (D2AP).

Results of the assessment showed a WS2 carriageway would operate at 75% of its capacity at 2027 (which is the threshold where congestion begins), whereas a D2AP would operate at 36% of its capacity for the same time period.

This assessment reinforces the Ministerial decision, announced in the RSTN TP, to dual this section of the A26 to a D2AP standard carriageway.

16.4 Consultation

Early consultation for this study was undertaken during Stage 1 Assessment in the form of an Information Day. The format of the consultation was an exhibition which was staffed by the design team (Arup and Roads Service). The exhibition was aimed at informing the public about the study, advising of the study area, providing information relating to the known engineering and environmental constraints and setting a programme for the study. Attendance was in excess of 200 members of the public and good feedback, both on the day and post-event, was received.

16.5 Corridors Considered

Twelve potential corridors were developed during the study. These comprised a mixture of central and off-line corridors, with corridors to the east, to the west and more central to the existing A26 route. These corridors are presented on drawing A26-HWY-005 (Appendix A).

Six corridors were rejected after a broad assessment. This was based upon consideration of potential impact upon key constraints and features within the study area. The remaining six corridors were, therefore, taken forward for further, more detailed assessment. The corridors taken forward are illustrated on drawing A26-HWY-006 (Appendix A) and were:

- Corridor 1 – Western 2. This corridor maximises the use of the existing A26 corridor to a point just south of the Frosses Trees. At this point, it moves off-line to the west, crossing the River Main and its associated floodplain. The corridor crosses the B93 (Killagan Road) immediately to the west of the Logan's retail facility from where it closely follows the Drumadoon watercourse before tying back into the existing A26 at the junction with the A44 (Drones Road). This corridor, together with Corridors 5 and 6, benefits from minimising traffic disruption during construction.
- Corridor 2 – Western 5. This corridor maximises the use of the existing A26 corridor to a point just north of the junction with Lisnasoo Road. At this point, it moves off-line to the west passing behind several residential properties along the line of the existing A26 until it passes immediately to the west of the Logan's retail facility. From here it closely follows the northern section of Corridor Option 1 to the tie-in to the existing A26 at the junction with the A44 (Drones Road).

- Corridor 3 – Western 6. This corridor maximises the use of the existing A26 corridor to a point just north of the junction with the B93 (Killagan Road). At this point the corridor moves off-line to the west, behind the residential properties and follows the northern section of Corridor Option 1 to the tie-in to the existing A26 at the junction with the A44 (Drones Road).
- Corridor 4 – Central. This corridor maximises the use of the existing A26 corridor for the majority of its length except for a distance of approximately 1 kilometre in the vicinity of the existing Cloghmills Water crossing, where the corridor deviates off-line to the west. The corridor rejoins the existing corridor south of the junction with Drumadoon Road and follows it to the northern end at the junction with the A44 (Drones Road). This corridor benefits from minimising land-take.
- Corridor 5 – Eastern 1. This corridor maximises the use of the existing A26 corridor to a point just south of the Frosses Trees. At this point, it moves off-line to the east behind residential properties and farm businesses, closely following the Old Frosses Road and Cloghmills Water, before tying back into the existing A26 at the junction with the A44 (Drones Road). This corridor, together with Corridors 1 and 6, benefits from minimising traffic disruption during construction.
- Corridor 6 – East-West. This corridor is common with Corridor Option 5 to a point just north of the Cloghmills Water crossing where it deviates to the northwest and diagonally crosses the existing A26 immediately north of the junction with the B93 (Killagan Road). From this point, the corridor continues west and follows the northern section of Corridor Option 1 to the tie-in with the existing A26 at the junction with the A44 (Drones Road). This corridor, together with Corridors 1 and 5, benefits from minimising traffic disruption during construction.

16.6 Corridor Assessment

An assessment of the six corridors was undertaken using the Government's objectives of environment, safety, economy, accessibility, and integration. Consideration was also given to engineering and traffic impacts.

It is considered that all the corridors could be designed in accordance with DMRB design standards for a 120kph design speed. However, Corridor 1 (and to a lesser extent Corridor 2) would require significant ground improvement works to stabilise poor ground. In addition, both Corridors 1 and 2 would require significant import of fill material to build substantial lengths of embankments over the River Main floodplain. Corridors 5 and 6 would largely pass through good engineering ground and a cut to fill balance could be achieved to minimise avoid the need for import material. The best performing corridor in terms of engineering impact was Corridor 5.

All corridors performed satisfactorily in terms of traffic capacity.

The environment objective assessment showed substantial negative environmental impacts for Corridor 1 with the potential impacts upon biodiversity (protected sites and species), water quality (impact upon floodplain), visual intrusion (road on embankment and difficult to mitigate) and noise. Corridors 5 and 6 also performed poorly in terms of environment, particularly in relation to biodiversity (negative impact upon 'greenfield' agricultural land). In terms of environment, the best performing corridors were Corridors 2, 3 and 4, primarily because of these corridors utilising more of the existing road.

The existing A26 has a poor safety record with 39 personal injury accidents being recorded between the 3-year period of 2002 and 2004. In terms of the safety objective, all the proposed corridors would be expected to significantly improve safety performance in relation to the existing route, but the off-line corridors (Corridors 1 and 5) which move the route away from the residential properties along the line of the existing road would be expected to provide the largest safety benefits.

The assessment of the economy objective is summarised in table 16.1.

Table 16.1: Summary of Economic Measures

Cost Item	Corridor 1: Western 2	Corridor 2: Western 5	Corridor 3: Western 6	Corridor 4: Central	Corridor 5: Eastern 1	Corridor 6: East-West
Cost Estimate (2005Q1)	£54.3M	£52.1M	£51.6M	£48.7M	£46.1M	£52.1M
Net Present Value (NPV) (2002)	£35.7M	£44.5M	£43.6M	£48.2M	£43.8M	£42.4M
Benefit to Cost Ratio (BCR)	1.90	2.18	2.19	2.39	2.30	2.08

The range of cost-estimates, based upon 2005Q1 prices for the corridors varies from £46.1 million to £54.3 million, with the least and most expensive being Corridors 5 and 1, respectively.

In terms of economic performance, over a 60 year period, the best performing corridor is Corridor 4 with a benefit to cost ratio (BCR) of 2.39 and a net present value (NPV) of over £48.2 million. However, there is little difference in economic performance between the corridors.

The accessibility objective was not assessed for this Stage 1 assessment.

In terms of the integration objective, all the corridors would contravene land use policy and other Government policies to some extent. However, Corridor 1 is the worst performing corridor as it would, most significantly, contravene policies concerning development on peatland; development on floodplain; and impact upon conservation. Corridors 5 and 6 would potentially contravene policies concerning development on agricultural land and ecology. Corridors 3 and 4 would be likely to have the least significant impact under the integration objective.

Assessment summary tables (ASTs) for the six corridors are provided in Appendix F.

16.7 Recommendations

Based upon the more detailed assessment of the six corridors as part of this Stage 1 Assessment process, we recommend that Corridor 1 be rejected because it performed the worst in three of the five NATA objectives: environment, economy and integration.

There is considered to be insufficient differentiation between the five remaining corridors to justify the rejection of any further corridors at this stage. It is therefore recommended that Corridors 2, 3, 4, 5 and 6 are carried forward into the Stage 2 Assessment process where route alignments within each corridor shall be assessed to provide a more detailed assessment, sufficient to determine a 'Preferred Route' option.

On this basis, these five Preferred Corridors to be taken forward into Stage 2 will be presented to the public at a 'Route Improvement Corridor Options Public Consultation Event'. A copy of the Leaflet for this Event is shown in Appendix G. For the purpose of this Event and for the subsequent Stage 2 Assessment, the five corridors shall be re-named as follows:

- Corridor 2 will be re-named as **Option 1**;
- Corridor 3 will be re-named as **Option 2**;
- Corridor 4 will be re-named as **Option 3**;
- Corridor 5 will be re-named as **Option 4**;
- Corridor 6 will be re-named as **Option 5**.

These five Preferred Options are presented on drawing A26-HWY-009 (Appendix A).

The views and comments received from the public during this Public Consultation Event and within the associated consultation period will be considered in the Stage 2 Assessment and will inform the decision on the 'Preferred Route' option.

Appendix A

Highways Drawings

A26-HWY-001	Map of Existing Features
A26-HWY-002	Existing Utility Services
A26-HWY-003	Route Improvement Techniques
A26-HWY-004	Route Improvement Assessment Areas
A26-HWY-005	Initial Corridors Considered
A26-HWY-006	Preferred Corridors
A26-HWY-009	Corridors to be taken forward into Stage 2 Assessment

Appendix B

Geotechnical Drawings

A26-GEO-001 Geotechnical Feature Plan

Appendix C

Planning Policy Guidance

C1 European Council Directives

C1.1 Council Directive 97/11/EC Environmental Impact Assessment

This Directive requires Member States to carry out an Environmental Impact Assessment (EIA) on certain public and private projects, before they are authorised, where it is believed that the projects are likely to have a significant impact on the environment. For some projects, such as the construction of motorways, airfields and nuclear power stations listed in Annex I to the Directive, such assessments are mandatory.

The objective of an EIA is to identify and describe to the fullest extent possible the potential environmental impacts associated with the construction and operation of a project and to assess whether prevention or mitigation is appropriate. An integral component of the EIA process is the implementation of an effective consultation with statutory bodies and community participation so that opportunities for the public can be provided to raise their concerns/ issues and to be involved throughout all phases of scheme development. Community feedback received during the preparation of the EIA and determination of the project must be taken into account prior to a project approval being granted.

C1.2 The Conservation of Natural Habitats and Wild Flora and Fauna Directive (92/43/EEC)

This Directive provides for the classification and designation of Special Protection Areas (SPA) and Special Areas of Conservation (SAC). Responsibility for the designation of these sites lies with the Environment and Heritage Service (EHS). The EHS will seek to ensure that, as far as possible and consistent with the objectives of each designation, this network of sites is protected from damage or destruction.

There is a designated SAC within the study area (described in greater detail in Chapter 4). Therefore, any corridors resulting in a potential impact upon this SAC shall require an appropriate assessment to be undertaken.

The “Habitats Directive” has been transposed into national legislation through the *Conservation (Natural Habitats) Regulations Northern Ireland 1995*. These regulations are currently under review for amendment in relation to a European Court of Justice Case.

C1.3 The Water Framework Directive (2000/60/EC)

The Water Framework Directive (WFD) establishes an overall framework for the protection of surface and ground waters. The directive uses an integrated approach to water management, based on natural river basins. It aims to simplify and rationalise current legislation and will gradually replace several existing key pieces of EU legislation. River basins must be clearly designated and monitored, with River Basin Management Plans drawn up tailored to the specific circumstances in that river basin.

The study area is located within the Neagh Bann International River Basin District (IRBD).

The directive is transposed to national legislation through the Water Environment Regulations (Northern Ireland) 2003.

C1.4 The Public Participation Directive (2003/35/EC)

This Directive provides for public participation in respect of the drawing up of certain plans and programmes relating to the environment. The Directive has been integrated into a number of regulations including the EIA Directive and Highways Regulations. Public authorities are obliged, under the Aarhus Convention to actively disseminate environmental information in their possession. They must allow the public affected, and environmental non-

governmental organisations, to comment on proposals for projects affecting the environment or plans and programmes relating to the environment.

C2 Northern Ireland Legislation

C2.1 The Roads Order 1993

The *Roads Order 1993* is the principal statutory instrument for the regulation of road/ highway development in Northern Ireland. Article 67 of the *Roads (Northern Ireland) Order 1993* implements EC Directive 85/337/EEC as amended by Council Directive 97/11/EC. The assessment will be based on DMRB TD 37/93 Stage 1, 2 and 3 Scheme Assessment.

If the scheme were to process past a Stage 2 Assessment, an Environmental Statement (ES) would need to be prepared as part of the Stage 3 Assessment process. An ES would be required in accordance with the provisions of Article 67(A) of the *Roads (Northern Ireland) Order 1993*, the *Roads (Environmental Impact Assessment) Regulations (Northern Ireland) 1999* and Development Control Advice Note 10 (DCAN10) Environmental Impact Assessment (DoE, 1999).

The preferred route would also require designation as a trunk road in accordance with Article 14(1) of the Roads (Northern Ireland) Order 1993.

Acquisition of Lands for construction of the preferred route would be required to conform to Articles 110 – 117 of the Roads (Northern Ireland) Order 1993.

C2.2 The Roads (Environmental Impact Assessment) Regulations (Northern Ireland) 1999

These regulations implement EC Directive 85/337/EEC as amended by Directive EC 97/11/EC. The 1999 Regulations are principally concerned with the assessment of certain public and private projects with regards to the environment. They are specifically relevant to the construction of new roads and/ or improvement of existing roads to which the Directive applies. These regulations further amend Article 67 of the Roads (Northern Ireland) Order 1993. Moreover they specify the effects that should be identified arising from road schemes and the associated requirements for mitigation.

C2.3 The Water Act (Northern Ireland) 1999

The Water Act contains provisions to combat and prevent pollution affecting waterways and groundwater. The responsible administering authority for matters that trigger the provisions of this legislation is the EHS.

C2.4 The Drainage (Northern Ireland) Order 1973 as amended by the Drainage (EIA) Regulations (Northern Ireland) 2001

The Drainage Order primarily deals with the Rivers Agency's function regarding drainage and flood defence structures, maintenance of watercourses and sea defences and protection of the drainage function of all watercourses. The EIA amendments to the Drainage Order are regarding the effects and impacts of a proposed drainage scheme on the environment.

C2.5 Drainage (Environmental Impact Assessment) Regulations (Northern Ireland) 2006

These Regulations implement the further changes that have been made to the EIA directive under the Public Participation Directive 2003/35/EC. They concern drainage works or marina works or a proposed drainage or canal scheme with regards to public participation on the impact on the environment of such drainage works.

C2.6 The Groundwater Regulations (Northern Ireland) 1998

This piece of legislation aims to prevent the pollution of groundwater. The 1998 regulations transpose the requirements of the EC Groundwater Directive 80/68/EEC. The Directive seeks to prevent the direct or indirect discharge of List I substances to groundwater and control pollution resulting from the direct or indirect discharge of List II substances to groundwater.

C2.7 The Pollution Prevention and Control Regulations (Northern Ireland) 2003

These regulations transpose the Integrated Pollution Prevention and Control (IPPC) Directive (96/61/EC). They require that different classes of installations obtain a permit to operate and take steps to prevent pollution, or where that is not possible, to minimise it using 'Best Available Techniques'. The Directive also requires that energy is used efficiently, that waste is minimised and recovered where possible, that measures are taken to prevent accidents and that sites are restored when operations cease.

C2.8 Environmental Impact Assessment (Uncultivated Land and Semi-Natural Areas) Regulations (Northern Ireland) Order 2001

These Regulations implement Council Directive 85 / 337/ EEC (as amended by Council Directive 97/11/EEC). Under the Regulations, approval must be sought from the Department of Agriculture and Rural Development (DARD). DARD would screen all such applications and any that would be likely to have significant environmental effects would be required to prepare an Environmental Impact Assessment.

C2.9 Agricultural Land (Removal of Surface Soil) Act 1953

This Act states that planning permission is required for the stripping or removal of topsoil.

C2.10 The Environment (Northern Ireland) Order 2002

The Order provides the Department of Environment for Northern Ireland with the power to declare areas of land as Areas of Special Scientific Interest (ASSI) where the land is of special interest by reason of its flora, fauna, geological, physiographical, or other features and needs to be protected.

C2.11 Fisheries Act (Northern Ireland) 1966 as amended 2001

The Fisheries Act aims to protect fisheries and their habitats. In particular it aims to prevent pollution of a watercourse, removal of material from a river bed and obstruction of fish passage and movement where weirs are constructed.

C2.12 The Historic Monuments and Archaeological Objects (Northern Ireland) Order 1995

This Order aims to protect historic monuments and archaeological objects. Scheduled Monument Consent must be sought for any works resulting in the demolition, destruction or disturbance of, or any damage to a scheduled monument; any works for the purpose of removing or repairing a scheduled monument or any part of it or of making any alterations or additions thereto; and any flooding or tipping operations on land in, on, or under, which there is a scheduled monument.

C2.13 The Clean Air (Northern Ireland) Order 1981

This legislation aims to prevent air pollution and makes it an offence to cause or permit the emission of dark smoke. It is also an offence to burn unauthorised fuel on farm businesses

that are close to towns and cities and fall within 'Smoke Control Areas' as declared by District Councils.

C2.14 The Amenity Lands Act (Northern Ireland) 1965

This has been largely repealed by the Nature Conservation and Amenity Lands (Northern Ireland) Order 1985, except for the provisions relating to Areas of Scientific Interest (ASI's), many of which have been re-categorised on declaration as ASSIs.

C2.15 The Nature Conservation and Amenity Lands (Northern Ireland) Order 1985 (as amended 1989)

This places particular emphasis on the establishment of a network of Areas of Special Scientific Interest (ASSIs), National Nature Reserves (NNRs), Nature Reserves (NRs) and Marine Nature Reserves (MNRs). These include areas important for their geology and land forms as well as for their wildlife.

C2.16 The Wildlife (Northern Ireland) Order 1985

The Wildlife (Northern Ireland) Order 1985 makes it an offence to intentionally kill, injure, or take any wild bird or their eggs or nests. Special penalties are available for offences related to birds listed on Schedule 1, for which there are additional offences of disturbing these birds at their nests, or their dependent young. The Order also prohibits certain methods of killing, injuring, or taking birds, restricts the sale and possession of captive bred birds, and sets standards for keeping birds in captivity. The Order makes it an offence to intentionally kill, injure, take, possess, or trade in any wild animal listed on Schedule 5, and prohibits interference with places used for shelter or protection, or intentionally disturbing animals occupying such places. The Order also prohibits certain methods of killing, injuring, or taking wild animals. The Order makes it an offence to pick, uproot, trade in, or possess (for the purposes of trade) any wild plant listed in Schedule 8, and prohibits the unauthorised intentional uprooting of such plants. The Order contains measures for preventing the establishment of species not native to Northern Ireland which may be detrimental to native wildlife, and prohibits the release of animals and the planting of plants listed on Schedule 9. It also provides a mechanism making any of the above offences legal through the granting of licences by the appropriate authorities.

C2.17 The Public Health Act 1878

The Public Health (Ireland) Act 1878, (as amended), contains the main legislation relating to statutory nuisances in Northern Ireland. Under this Act, and the amended Public Health Act 1994, Local Authorities have a responsibility to monitor their areas for odour nuisance and can investigate complaints from the public. The Act also covers water supply and sewerage issues.

C3 Relevant Planning Policies and Guidance

C3.1 Shaping Our Future: The Regional Development Strategy for Northern Ireland 2025

The Regional Development Strategy (RDS) 2025 sets out a long-term transportation vision for Northern Ireland. Principally, the vision aims:

“to have a modern, sustainable, safe transportation system which benefits society, the economy and the environment and which actively contributes to social inclusion and everyone’s quality of life”.

The RDS recognises that Northern Ireland is heavily dependent on a road-based transport system reflecting the small internal transport market and dispersed settlement pattern.

The RDS presents four Strategic Planning Guidelines:

- SPG - TRAN 1: To develop a Regional Strategic Transport Network based on key transport corridors, to enhance accessibility to regional facilities and services;
- SPG - TRAN 2: To extend travel choice for all sections of the community by enhancing public transport;
- SPG - TRAN 3: To integrate land use and transportation; and
- SPG - TRAN 4: To change the regional travel culture and contribute to healthier lifestyles.

C3.2 A Planning Strategy for Rural Northern Ireland

This Strategy establishes the objectives and the policies for land use and development appropriate to Northern Ireland. It provides a basis for coordinating decisions in both the public and the private sectors and sets out regional policies for the control of development, to ensure a consistent approach to rural planning matters. Objectives of the strategy include:

- to protect and enhance the natural and man-made environment;
- to meet the future development needs of the rural community;
- to facilitate regeneration of the rural economy;
- to accommodate change, while maintaining the character of the countryside;
- to revitalise rural towns and villages in order to make them more attractive places in which to live and work ; and
- to promote a high quality of design in new development.

The details of the strategy are outlined in a number of policies, some of which have been superseded by the Planning Policy Statements. Policy SP11 on Transportation states that its objective is to facilitate the maintenance and development of an effective and efficient transport network. It will also facilitate the upgrading of the transportation system subject to environmental and planning considerations. The strategy also has policy statements on Heritage, Environmental Protection and Rural Landscapes.

C3.3 Northern Area Plan 2010-2016

The Northern Area Plan 2016 provides a framework to guide development for the study area with the exception of an area subject to the provisions of the Antrim, Ballymena and Larne Area Plan 2016. The Plan is based on the development of hubs, corridors, gateway of the area and the maintenance of vibrant local communities.

The Plan details elements of the area of interest around the Clogh Mills and Dunloy settlement areas. Both areas are defined as large villages, which act as a service centre for the surrounding hinterland. Local Landscape Policy areas have been identified in both areas, both for their natural landscape character and heritage issues.

The Plan identifies the provision for the further enhancement of the Northern Key Transport Corridor along the A26 between the Glarryford Crossroads and the A44 junction. It states the need to reduce congestion and to facilitate improvements which may result in increase safety and reduced journey times. The individual polices within the plan which relate to the proposed scheme include:

- Policy Env 1 – Biodiversity;
- Policy Env 2 – Local Landscape Policy Area;
- Policy Env 3 – Sites of Local Nature Conservation Importance;

- Policy Env 4 – Trees;
- Policy Env 5 – Development adjacent to a Main River;
- Policy Env 6 – Areas of Townscape/Village Character;
- Policy Env 7 – Areas of Significant Archaeological Interest;
- Policy OSR1 – Public Rights of Way and Permissive Paths;
- Policy PSU1 – Watercourse Management; and
- Policy PSU2 – Ground and Surface Water Resources.

The A26 Glarryford to A44 Dualling has been designated as a rural route protection, in which planning permission for other developments will not be granted if it would prejudice the availability of land for the above scheme. Polices directly related to scheme development include:

- Policy TRA1 - Rural Route Protection;
- Proposal TRA2 - Rural Route Protection;
- Policy TRA3 - Rural Road Improvement Schemes; and
- Proposal TRA4 - Rural Road Improvement Schemes.

C3.4 The Antrim, Ballymena and Larne Area Plan 2016

This Plan provides a framework to guide development in a small part of the southern study area. It is currently at pre-draft stage and due to be published in 2008. In the absence of this Plan, the provisions of the Ballymena Area Plan 1986-2000 should be considered for the purposes of this scheme.

A section of the study area is located within the Ballymena Borough and thus forms part of this development plan. In the 2002 Issues paper the Ballymena Countryside Policy Area designation applies to the A26 Road Frontage.

C3.5 Regional Transport Strategy 2002-2012 (RTS)

The Regional Transport Strategy (RTS) sets out the progress towards delivery of the transportation vision that can be achieved over the ten-year period 2002-12. The strategy outlines the delivery structures and identifies the transport plans through which it will be implemented, namely the:

- Regional Strategic Transport Network Transport Plan (RSTN TP);
- Belfast Metropolitan Transport Plan (BMTP); and
- Sub-Regional Transport Plan (SRTP).

The RTS provides a commitment to develop and maintain the RSTN to enhance accessibility on an integrated basis for all users, and to examine access to regional gateways and cross border links, with an emphasis on improving connections from the 5 Key Corridors and 4 Link Corridors.

C3.6 Regional Strategic Transport Network Transport Plan 2015 (RSTN)

The RSTN TP sets out how the RTS will be implemented in the Regional Strategic Transport Network (RSTN). The RSTN TP comprises of 5 Key Transport Corridors, 4 Link Corridors and the Belfast Metropolitan Area Corridors, along with the remainder of the trunk road network. The Key Transport Corridors are the upper tier of the Region's long distance routes connecting a number of towns to the major regional gateways and the BMA.

The RSTN TP confirms the individual schemes and projects to be implemented (subject to economic and other assessments, statutory processes and the availability of resources) to support the RDS and RTS objectives/ targets. It sets out plans for short, medium and longer-term proposals as well as proposals for the maintenance, management and development of Northern Ireland's Strategic Transport Network.

The A26 is defined as part of a Key Transport Corridor and included in the plan for strategic road improvement.

C3.7 Draft Sub-Regional Transport Plan 2015 (SRTP)

The SRTP deals with the transport needs of the whole of Northern Ireland with the exception of the Belfast Metropolitan Area and the rail and trunk road networks which are covered in earlier Transport Plans. The SRTP identifies separate packages of measures for the period 2002 – 2015 by the following mode of transport:

- Walking and cycling;
- Public transport; and
- Highways and traffic management.

C3.8 Development Control Advice Note 10 (DCAN10) Environmental Impact Assessment – NI Planning Service 1999

The DCAN10 provides general guidance on the Environmental Impact Assessment (NI) Regulations. It also provides advice on interpretation of the regulations, guidelines on producing environmental statements and outlines the roles and responsibilities of consultees.

C3.9 Northern Ireland Air Quality Policy Guidance

This document provides guidance on ambient air quality management, including air quality reviews, assessments, air quality action planning, transport planning and land use planning. A key part of local air quality management is to reduce the contribution of road transport emissions.

C3.10 Northern Ireland Biodiversity Strategy (NIBG)

The function of the NIBG is to develop a strategy, which assists in delivering the UK's biodiversity commitment and takes into account the particular circumstances of Northern Ireland. The Strategy has identified 15 major issues affecting Biodiversity in Northern Ireland and a number of specific recommendations to tackle these issues. Specific issues which relate to the A26 Dualling include:

- Agricultural Systems and Support;
- Freshwater Use and Management;
- Construction & Development;
- Tourism & Recreation;
- Peatland Management and
- Introduced Species & Genetic Material.

C3.11 Northern Ireland Biodiversity Implementation Plan 2005 -2008

The Implementation Plan contains fifty-six actions which the EHS will undertake to achieve the objectives of the NI Biodiversity Strategy. The actions have target dates of between 2006 and 2008.

C3.12 The Conservation Peatland Policy 1993

The Conservation Peatland Policy published in 1993, has now had many of the action points implemented, and the policy is currently being revised. Additionally, government policies for the protection and conservation of peatland habitats in Northern Ireland are outlined in the document "Conserving Peatland in Northern Ireland - A Statement of Policy". An important aspect of the Peatland Policy is that its development, and the proposed initiatives, relate not just to Environment and Heritage Service (EHS) but integrate all Government activities including Forestry, Agriculture and Planning.

C3.13 Northern Ireland Habitat & Species Action Plans

The UK priority habitats and species that occur in Northern Ireland are considered to be automatically selected as priority habitats and species in Northern Ireland. An additional Northern Ireland habitat is also identified for montane heath. Species specific to Northern Ireland requiring conservation action have also been identified. These include the Irish Hare, Chough, Curlew and Red Squirrel. All-Ireland species action plans have been prepared for the Irish Hare, Corncrake, Pollan and Irish lady's tresses orchid, as for these species action is best undertaken at an all-Ireland level.

Habitats of concern for this scheme include lowland raised bogs and species rich hedgerows. Species of concern will be identified during the stage 2 environmental surveys.

C3.14 Northern Ireland River Conservation Strategy

The conservation strategy sets out to identify and protect the natural and built heritage of rivers in Northern Ireland. The strategy consists of a number of objectives and actions to protect river corridors and facilitate their sustainable use.

C4 Relevant Northern Ireland Planning Policy Statements

The relevant Planning Policy Statements (PPS) which may apply to this scheme are discussed below. These PPS's establish the Government's guidance on the use and planning of land for all forms of development to ensure that consideration is given to a range of key principles such as sustainability, nature conservation and sustainable transport

A more detailed assessment will be carried out to determine the scheme's consistency against the range of key principles provided in these requisite PPSs. This assessment will be conducted during the next stages of scheme development.

C4.1 PPS1 General Principles (DOE March 1998)

PPS1 states the general principles in formulating planning policies, making development plans and exercising control of development. The Statement also sets out the key themes that underlie the approach to planning across the whole range of land-use topics. These are sustainable development, mixed- use, quality development and design.

C4.2 PPS2 Nature Conservation (DOE June 1997)

PPS2 sets out policies for the protection of important wildlife sites, with the most important sites being served by more robust policies and a stricter series of tests for developers to satisfy. A review of PPS 2 was proposed for 2005/2006, and while this has been initiated, it has been suspended while other priorities are assessed.

C4.3 PPS3 Access, Movement and Parking (DOE Feb 1995)

PPS3 sets out planning policies for vehicular and pedestrian access, the protection of transport routes, transport assessment, and parking.

C4.4 PPS6 Planning, Archaeology & Built Heritage (DOE March 1999)

PPS6 sets out the planning policies for the protection and conservation of archaeological remains and features of the built heritage. It provides guidance on direct physical impacts upon the natural or man-made environments. In particular, areas of concern for the proposed A26 Dualling scheme include archaeological sites and monuments, listed buildings, and conservation areas. PPS6 also details a section on Transport and Traffic, where the impact of new routes and routes in the vicinity of existing historic structures shall be assessed.

C4.5 PPS6 Addendum Areas of Townscape Character (DOE August 2005)

The addendum to PPS6 states the planning policies for demolition of buildings, new development and the control of advertisements in Areas of Townscape Character. It aims to ensure that development proposals respect the appearance and qualities of each townscape area and maintain or enhance their distinctive character.

C4.6 PPS11 Planning and Waste Management (DOE December 2002)

PPS11 essentially relates to the development of waste management facilities. The policy also has regard for land improvement through the disposal of inert waste and the concept of waste minimisation in new developments.

C4.7 PPS13 Transportation and Land Use (DRD February 2005)

PPS13 has been prepared to assist in the implementation of the Regional Development Strategy to guide the integration of transportation and land use. It will guide the integration of transportation and land use, particularly through the preparation of development plans and transport plans, prepared respectively by DOE Planning Service and DRD Roads Service.

The policy statement also states the need for Transport Assessment and requires a comprehensive review of all the potential transport impacts of a proposed development or redevelopment, with an agreed plan to mitigate any adverse consequences. It aims to provide information so that decision makers can better understand how a proposed development is likely to function in transport terms.

C4.8 PPS14 Draft Sustainable Development in the Countryside (DRD March 2006)

PPS14 has been drafted to support the Regional Development Strategy (RDS). It specifically responds to the increasing pressure for single dwellings in the countryside. It also contains information in relation to replacement dwellings, the integration and design of all new buildings, rural character, ribbon development, farm diversification, agricultural buildings and development relying on non-mains sewerage.

C4.9 PPS15 Planning and Flood Risk (DOE June 2006)

The policy statement on flood risk seeks to minimise flood risk to people, property and the environment. It includes the concepts of sustainable development and the conservation of biodiversity. The precautionary approach to development is also an important theme that takes account of climate change and supports the wellbeing and safety of people. In reference to the A26 Dualling, policies FLD1 development in flood plains, FLD3 development beyond flood plains and FLD4 flooding and land drainage will be of particular relevance.

Appendix D

Environmental Drawings

A26-ENV-001	Phase 1 Habitat Survey Plan
A26-ENV-002	Best & Most Versatile Agricultural Land Plan
A26-ENV-003	1:100 Year Flood Level Mapping
A26-ENV-004	Environmental Constraints Plan
A26-ENV-005	Noise Sensitive Receptors - Western 2 Corridor
A26-ENV-006	Air Sensitive Receptors - Western 2 Corridor
A26-ENV-007	Noise Sensitive Receptors - Western 5 Corridor
A26-ENV-008	Air Sensitive Receptors - Western 5 Corridor
A26-ENV-009	Noise Sensitive Receptors - Western 6 Corridor
A26-ENV-010	Air Sensitive Receptors - Western 6 Corridor
A26-ENV-011	Noise Sensitive Receptors - Central Corridor
A26-ENV-012	Air Sensitive Receptors - Central Corridor
A26-ENV-013	Noise Sensitive Receptors - Eastern 1 Corridor
A26-ENV-014	Air Sensitive Receptors - Eastern Corridor
A26-ENV-015	Noise Sensitive Receptors – East-West Corridor
A26-ENV-016	Air Sensitive Receptors – East-West Corridor

Appendix E

Stage 1 Risk Register

ROADS SERVICE

ARUP

Project Title:

A26 DUALLING PROJECT

Design stage:

Stage 1 PRELIMINARY DESIGN

Probability

Scale	Typical Range (%)		Value
Remote	0%	1%	1
Very Low	1%	10%	2
Low	10%	30%	3
Medium	30%	50%	4
High	50%	70%	5
Very High	70%	100%	6

Severity (Liability, Impact)

Scale	Cost (£)		Time		Value
Insignificant	<100,000		<1 week		1
Low	100,000	300,000	1 week	2 weeks	2
Medium	300,000	500,000	2 weeks	1 month	3
Serious	500,000	1,000,000	1 month	6 months	4
Very Serious	1,000,000	5,000,000	6 months	12 months	5
Catastrophic	>5000000		>12 months	-	6

Risk Classification Scheme

Risk:Severity	Risk Likelihood: Remote 0.05 (1)	Very Low 0.25(2)	Low 0.45(3)	Medium 0.65(4)	High 0.85(5)	Very High 1.05(6)
Catastrophic 1.6(6)	0.08	0.4	0.72	1.04	1.36	1.68
Very High 0.8(5)	0.04	0.2	0.36	0.52	0.68	0.84
High 0.4(4)	0.02	0.1	0.18	0.26	0.34	0.42
Medium 0.2(3)	0.01	0.05	0.09	0.13	0.17	0.21
Low 0.1(2)	0.005	0.025	0.045	0.065	0.085	0.1
Very Low 0.05(1)	0.0025	0.013	0.023	0.033	0.043	0.05

Project ref:

\\belrds02\jobs\120000\120429\4 Internal Project Data\4-49 Calculations\4-44 Quantity Surveyor

Issue: 02

Date: 10/10/2006

Approved by: S Hall

Risk ID	Work Package or Discipline	Cause	Effect/Risk Description	Risk Type (e.g. Cost, Programme, Safety)	Option	Partially Mitigated Risk Rating			Probability		Severity			RiskAnalysis			Additional Mitigation Measures	Mitigation Target Date	Comments	Arup Monitor	Status
					1/2/3, 4, 5, 6, ALL	Probability	Severity	Risk	P1	P0	Min	Likely	Max	Probability Distribution	Impact Distribution	Forced Sampling					
	GENERIC RISK																				
GEN_01	Political/Legal	Government change in policy	Scheme abandoned	Commercial	ALL	2	6	0.400	*5.5%*	*94.5%*				#NAME?	0	#NAME?					
GEN_02	Land	Land acquisition	Underestimate land acquisition/ compensation rates	Capital cost	ALL	5	4	0.340	*60.0%*	*40.0%*				#NAME?	0	#NAME?					
GEN_03	Security	Scheme protestors	Increased cost of additional security measures (e.g. fencing)	Capital cost	ALL	2	1	0.013	*5.5%*	*94.5%*				#NAME?	0	#NAME?					
GEN_04	Planning and Approvals	Public Inquiry	Changes in design following Order publication.	Capital cost	ALL	4	3	0.130	*40.0%*	*60.0%*				#NAME?	0	#NAME?					
GEN_05	Planning and Approvals	Public Inquiry	Scheme loses inquiry leading to redesign	Programme	ALL	1	6	0.080	*0.5%*	*99.5%*				#NAME?	0	#NAME?					
GEN_06	Financial/ Economical	Scheme cost estimate exceeds allocated funds (£33.4m)	No budget for the scheme. Programme delay whilst await additional funding	Programme	ALL	5	6	1.360	*60.0%*	*40.0%*				#NAME?	0	#NAME?					
GEN_07	Financial/ Economical	Scheme cost estimate exceeds allocated funds (£33.4m)	No budget for the scheme. Scheme no longer viable	Commercial	ALL	5	6	1.360	*60.0%*	*40.0%*				#NAME?	0	#NAME?					
GEN_08	Financial/ Economical	Market conditions	Inflated tender prices	Capital cost	ALL	5	5	0.680	*60.0%*	*40.0%*				#NAME?	0	#NAME?					
	DISCIPLINE-SPECIFIC RISK																				
HIG_01	Highways	Unknown future changes to design standards	Increased costs in order to comply with changes	Capital cost	ALL	2	2	0.025	*5.5%*	*94.5%*				#NAME?	0	#NAME?					
HIG_02	Highways	Approvals for departures from standards take longer than expected	Programme delay	Programme	ALL	4	4	0.260	*40.0%*	*60.0%*				#NAME?	0	#NAME?					
HIG_03	Highways	Inaccurate survey data	More land required than anticipated to accommodate alignment or alternative solution	Capital cost	ALL	2	3	0.050	*5.5%*	*94.5%*				#NAME?	0	#NAME?					
HIG_04	Highways	Inaccurate survey data	More land required than anticipated to accommodate alignment. Programme delay whilst resubmit planning	Programme	ALL	2	2	0.025	*5.5%*	*94.5%*				#NAME?	0	#NAME?					
HIG_05	Highways	More properties successfully claim against blight than expected	Additional cost of compensation	Capital cost	1,2,3,6	2	3	0.050	*5.5%*	*94.5%*				#NAME?	0	#NAME?					
HIG_06	Highways	More properties successfully claim against blight than expected	Additional cost of compensation	Capital cost	4,5	4	4	0.260	*40.0%*	*60.0%*				#NAME?	0	#NAME?					
HIG_07	Highways	Unforeseen proposed developments along route	Cost of acquiring development site or additional mitigation (e.g. noise barriers)	Capital cost	4	2	4	0.100	*5.5%*	*94.5%*				#NAME?	0	#NAME?			PPS3 prevents developments not already in pipeline		
HIG_08	Highways	Inaccurate traffic data	Incorrect junction strategy. Redesign of interchanges & junctions	Capital cost	ALL	2	2	0.025	*5.5%*	*94.5%*				#NAME?	0	#NAME?					
HIG_09	Highways	Traffic management problems during construction	Programme delay	Programme	2,3,4	5	4	0.340	*60.0%*	*40.0%*				#NAME?	0	#NAME?					
HIG_10	Highways	Traffic management problems during construction	Programme delay	Programme	1,5,6	4	3	0.130	*40.0%*	*60.0%*				#NAME?	0	#NAME?					
HIG_11	Highways	Traffic management problems during construction	Additional costs	Capital cost	2,3,4	5	4	0.340	*60.0%*	*40.0%*				#NAME?	0	#NAME?					
HIG_12	Highways	Traffic management problems during construction	Additional costs	Capital cost	1,5,6	4	3	0.130	*40.0%*	*60.0%*				#NAME?	0	#NAME?					

Risk ID	Work Package or Discipline	Cause	Effect/Risk Description	Risk Type (e.g. Cost, Programme, Safety)	Option	Partially Mitigated Risk Rating			Probability		Severity			RiskAnalysis			Additional Mitigation Measures	Mitigation Target Date	Comments	Arup Monitor	Status
					1/2/3, 4, 5, 6, ALL	Probability	Severity	Risk	P1	P0	Min	Likely	Max	Probability Distribution	Impact Distribution	Forced Sampling					
HIG_13	Highways	Extension to scheme length (tie in at Dunloy crossroads rather than A44)	Increase in capital cost of scheme	Capital cost	ALL	4	5	0.520	*40.0%*	*60.0%*				#NAME?	0	#NAME?					
HIG_14	Highways	Extension to scheme length (tie in at Dunloy crossroads rather than A44)	Programme delay whilst redesign	Programme	ALL	4	4	0.260	*40.0%*	*60.0%*				#NAME?	0	#NAME?					
UTI_01	Utilities	Unknown statutory utilities	Additional cost of diverting/protecting	Capital cost	2,3,4	2	4	0.100	*5.5%*	*94.5%*				#NAME?	0	#NAME?					
UTI_02	Utilities	Unknown statutory utilities	Programme delay whilst divert/protect utilities	Programme	2,3,4	2	4	0.100	*5.5%*	*94.5%*				#NAME?	0	#NAME?					
UTI_05	Utilities	Unknown statutory utilities	Additional cost of diverting/protecting	Capital cost	1,5,6	1	4	0.020	*0.5%*	*99.5%*											
UTI_06	Utilities	Unknown statutory utilities	Programme delay whilst divert/protect utilities	Programme	1,5,6	1	4	0.020	*0.5%*	*99.5%*											
UTI_03	Utilities	Uncertainty regarding scope of work to known utilities required by statutory undertakers	Cost different from expected	Capital cost	4	5	2	0.085	*60.0%*	*40.0%*				#NAME?	0	#NAME?					
UTI_04	Utilities	Statutory undertakers require long lead-in times to carry out works	Programme delay	Programme	4	2	4	0.100	*5.5%*	*94.5%*				#NAME?	0	#NAME?					
GEO_01	Geotechnics	Poor ground along the valley of the River Main	Cost of removal or pre-treatment prior to embankment construction.	Capital cost	1,2,3,6	2	3	0.050	*5.5%*	*94.5%*				#NAME?	0	#NAME?	Avoid - Favours Eastern option		Peat and Alluvium is generally thin (~2.0m) ; soft ground; settlement and creep issues; possible ground gas issues.		
GEO_02	Geotechnics	Uncertainty of peat deposits to be disposed of	Additional cost of removal off site	Capital cost	1	2	2	0.025	*5.5%*	*94.5%*				#NAME?	0	#NAME?					
GEO_03	Geotechnics	Drumlin Topography (East of existing A26)	Cost of cut and fill earthworks required across irregular topography.	Capital cost	5,6	2	2	0.025	*5.5%*	*94.5%*				#NAME?	0	#NAME?	Avoid - Favours Western option		Risk is: • Very hard clay in cut slopes into the glacial till forming the Drumlins; • Presence of boulders in excavations and structure foundations • Unpredictable groundwater bearing gravel lenses		
GEO_04	Geotechnics	Infilled Kettle Holes beneath River Main Valley bottom. Sudden (and possibly unpredictable) increase in the thickness of peat deposits.	Programme delay whilst redesign alignment.	Programme	1	4	3	0.130	*40.0%*	*60.0%*				#NAME?	0	#NAME?	Thorough investigation to locate features prior to construction		Risk is: • May require removal prior to construction. • Soft ground. Settlement and creep issues • Possible ground gas issues • Increased construction costs (if anticipated) • Increased construction cost and progamme delay [unforeseen ground condition] (if encountered during construction)		
GEO_05	Geotechnics	Infilled Kettle Holes beneath River Main Valley Bottom. Sudden (and possibly unpredictable) increase in the thickness of Peat deposits.	Cost of redesigning and associated cost of construction (e.g. excavation, ground improvements etc.)	Capital cost	1	4	2	0.065	*40.0%*	*60.0%*				#NAME?	0	#NAME?	Thorough Investigation to locate features prior to construction		Risk is: • May require removal prior to construction. • Soft ground. Settlement and creep issues • Possible ground gas issues. • Increased construction costs (if anticipated) • Increased construction cost and progamme delay [unforeseen ground condition] (if encountered during construction)		
GEO_06	Geotechnics	High Groundwater	Cost of additional drainage measures & de-watering during construction	Capital cost	1	3	3	0.090	*20.0%*	*80.0%*				#NAME?	0	#NAME?	Temporary construction dewatering		High groundwater will be anticipated across the valley bottom of the River Main, and probably locally elsewhere. Risk is: • Flooding • Inundation of embankmenk • Impact on drainage		
GEO_07	Geotechnics	Springs -A very large number of springs occur on the east side of the River Main valley bottom	Cost of additional drainage measures & de-watering during construction	Capital cost	ALL	4	3	0.130	*40.0%*	*60.0%*				#NAME?	0	#NAME?	Identify all locations		Risk is: • Local and possibly unpredicatable areas of high groundwater • Local flooding • Extra drainage measures required		
GEO_08	Geotechnics	Private water supply. Disruption or severing of private water supply	Cost of compensation to offtakers	Capital cost	2,3,4,5,6	4	2	0.065	*40.0%*	*60.0%*				#NAME?	0	#NAME?	Identify all points of private water supply (Lisenced and Unlicensed). Review scheme proposal for each (where appropriate)				
GEO_09	Geotechnics	Aquifer and surface water protection	Cost of additional protection measures (e.g. interceptors, sealed drainage)	Capital cost	1,2,3,4,6	4	3	0.130	*40.0%*	*60.0%*				#NAME?	0	#NAME?	Discuss proposals with relevent authority		Risk is: • Possible requirement for lined drainage • Provision of interceptors • Control of run off		
GEO_10	Geotechnics	Backfilled gravel pits	Cost of excavation and disposal	Capital cost	1,2,3,6	4	3	0.130	*40.0%*	*60.0%*				#NAME?	0	#NAME?	Identify all locations. Avoid if possible		Several former gravel pits are present within the Options Study area. Risk is: • Infilled with non inert waste material. Potential for contamination. • Soft ground and gassing issues • Requirement for dig out and dispose.		
GEO_11	Geotechnics	Areas of made ground	Cost of excavation and disposal	Capital cost	ALL	4	3	0.130	*40.0%*	*60.0%*				#NAME?	0	#NAME?	Inspect and investigate		Risk is: • Unconsolidated and variable ground • Potential for contamination • Requirement to dig out and dispose		
GEO_12	Geotechnics	Contamination from Garage /Filling Station (2 No.)	Cost of treatment and clean up	Capital cost	4	5	4	0.340	*60.0%*	*40.0%*				#NAME?	0	#NAME?	Inspect and investigate		Risk is: • Leaking fuel tanks. • Uncontrolled disposal of motor oils etc. • Clean up required • Impact on aquifer/controlled water		
GEO_13	Geotechnics	Main GI runs immediately after Preliminary GI	Inability to target Main GI onto the appropiate areas. Overconservative design	Capital cost	1	not assessed	not assessed	0.000	*#N/A*	*#N/A*				#NAME?	0	#NAME?	Do not run main GI immediately after preliminary GI phase. Allow sufficient time for review of preliminary phase and use this to plan main phase				
GEO_14	Geotechnics	Bog ASSI	Additional cost associated with drainage & environmental protection	Capital cost	1,2,3,4	5	3	0.170	*60.0%*	*40.0%*				#NAME?	0	#NAME?	Providing a detailed hydrogeological model to demonstrate negligible impact. Construction and Post Construction Monitoring to be carried out		Risk is: • Adverse impact of works on hydrogeology eg increase / decrease in gwl • Adverse Impact of Works on flora/fuauna/environment		

Risk ID	Work Package or Discipline	Cause	Effect/Risk Description	Risk Type (e.g. Cost, Programme, Safety)	Option	Partially Mitigated Risk Rating			Probability		Severity			RiskAnalysis			Additional Mitigation Measures	Mitigation Target Date	Comments	Arup Monitor	Status
					1/2/3, 4, 5, 6, ALL	Probability	Severity	Risk	P1	P0	Min	Likely	Max	Probability Distribution	Impact Distribution	Forced Sampling					
GEO_15	Geotechnics	Access for GI / Surveys	Programme delay whilst gain access	Programme	ALL	3	3	0.090	*20.0%*	*80.0%*				#NAME?	0	#NAME?	Effective Public Consultation		Risk is: 1) Unable in consider ground conditions 2) Vital information missed 3) Unexpected ground conditions encountered during construction 4) Very conservative design required		
GEO_16	Geotechnics	Inaccurate survey data leading to earthworks imbalance	Increased cost of importing or disposal	Capital cost	ALL	2	3	0.050	*5.5%*	*94.5%*				#NAME?	0	#NAME?					
P&A_01	Planning and Approvals	Multiple approvals required which could influence the highway design, procurement process and ultimately project delivery	Programme delay whilst obtain approvals	Programme	ALL	4	4	0.260	*40.0%*	*60.0%*				#NAME?	0	#NAME?					
P&A_02	Planning and Approvals	Multiple approvals required which could influence the highway design, procurement process and ultimately project delivery	Cost associated with redesign	Capital cost	ALL	4	2	0.065	*40.0%*	*60.0%*				#NAME?	0	#NAME?					
P&A_03	Planning and Approvals	Lack of available background information and/or poor turnaround times for the provision of information following requests for information	Programme delay	Programme	ALL	5	4	0.340	*60.0%*	*40.0%*				#NAME?	0	#NAME?					
ENV_01	Environmental	Unknown (i.e. buried or in-situ) archaeological relics / sites of significance that could significantly constrain road works	Programme delay	Programme	1,2,3,5,6	4	4	0.260	*40.0%*	*60.0%*				#NAME?	0	#NAME?					
ENV_02	Environmental	Unknown (i.e. buried or in-situ) archaeological relics / sites of significance that could significantly constrain road works	Programme delay	Programme	4	2	4	0.100	*5.5%*	*94.5%*				#NAME?	0	#NAME?					
ENV_03	Environmental	Unknown (i.e. buried or in-situ) archaeological relics / sites of significance that could significantly constrain road works	Cost of expert investigation and watching brief	Capital cost	1,2,3,5,6	4	4	0.260	*40.0%*	*60.0%*				#NAME?	0	#NAME?					
ENV_04	Environmental	Unknown (i.e. buried or in-situ) archaeological relics / sites of significance that could significantly constrain road works	Cost of expert investigation and watching brief	Capital cost	4	2	4	0.100	*5.5%*	*94.5%*				#NAME?	0	#NAME?					
ENV_05	Environmental	Protection of Frosses trees	Cost of environmental protection measures and design treatments	Capital cost	4	5	1	0.043	*60.0%*	*40.0%*				#NAME?	0	#NAME?					
ENV_06	Environmental	Changes in legislation / policy and/or new case law resulting in delays to the project or changes in the highway design	Cost of additional surveys	Capital cost	ALL	3	2	0.045	*20.0%*	*80.0%*				#NAME?	0	#NAME?					
ENV_07	Environmental	Changes in legislation / policy and/or new case law resulting in delays to the project or changes in the highway design	Programme delay whilst undertake additional surveys	Programme	ALL	3	4	0.180	*20.0%*	*80.0%*				#NAME?	0	#NAME?					
ENV_08	Environmental	Flood risk (currently unknown) and the management of flood waters passing through the area of interest - could impact location of preferred route, highway design and behaviour / pattern of flooding throughout the River Main catchment area	Cost of design and associated works	Capital cost	1,2,3	5	4	0.340	*60.0%*	*40.0%*				#NAME?	0	#NAME?			1:100 year flood-level mapping carried out for River Main and Clogh Mill Waters		
ENV_09	Environmental	Flood risk (currently unknown) and the management of flood waters passing through the area of interest - impact on location of preferred route, highway design and behaviour / pattern of flooding throughout the River Main catchment area	Cost of design and associated works	Capital cost	4,5,6	3	3	0.090	*20.0%*	*80.0%*				#NAME?	0	#NAME?			1:100 year flood-level mapping carried out for River Main and Clogh Mill Waters		
ENV_10	Environmental	Indirect effects associated with highway runoff, changes in light/noise/air on the Main Valley Bogs SAC impacts on the qualifying interests of the SAC, particularly in the vicinity of the Frosses Bog	Cost of additional environmental mitigation measures (e.g. water quality & pollution control)	Capital cost	ALL	4	2	0.065	*40.0%*	*60.0%*				#NAME?	0	#NAME?					
ENV_11	Environmental	Potential adverse impacts of the dualling project on the hydrological patterns / connections / integrity of the Main Valley Bogs SAC	Cost of additional environmental mitigation measures (e.g. water quality & pollution control)	Capital cost	1	5	5	0.680	*60.0%*	*40.0%*				#NAME?	0	#NAME?					
ENV_12	Environmental	Need to conduct an Article 6 Appropriate assessment under the EC Habitats Directive to demonstrate that the dualling project will not result in any significant adverse effects on the qualifying interests of the SAC or otherwise -	Cost of additional survey work/ application of more rigorous survey methodologies and potentially have implications on the programme	Capital cost	ALL	2	1	0.013	*5.5%*	*94.5%*				#NAME?	0	#NAME?					
ENV_13	Environmental	Need to conduct an Article 6 Appropriate assessment under the EC Habitats Directive to demonstrate that the dualling project will not result in any significant adverse effects on the qualifying interests of the SAC or otherwise -	Programme delay	Programme	ALL	2	5	0.200	*5.5%*	*94.5%*				#NAME?	0	#NAME?					
ENV_14	Environmental	Management and control of traffic noise, potential exposure of new properties to noise issues	Cost of providing additional noise mitigation measures	Capital cost	2,3,4,5,6	3	2	0.045	*20.0%*	*80.0%*				#NAME?	0	#NAME?					
ENV_15	Environmental	Impact of the dualling project on local landscape character and the visual setting	Cost of landscape mitigation measures	Capital cost	1	5	3	0.170	*60.0%*	*40.0%*				#NAME?	0	#NAME?					
ENV_16	Environmental	Impact of the dualling project on local landscape character and the visual setting	Cost of landscape mitigation measures	Capital cost	2,3,4,5,6	4	2	0.065	*40.0%*	*60.0%*				#NAME?	0	#NAME?					
ENV_17	Environmental	Loss and removal of key habitats of interest / ecological communities used by priority species	Cost of environmental protection measures and offsets	Capital cost	1	5	1	0.043	*60.0%*	*40.0%*				#NAME?	0	#NAME?					
ENV_18	Environmental	Loss of good quality agricultural lands and/or hindrance to the efficient workings of these lands and current agricultural practices	Cost of providing mitigation measures/ agricultural connection between severed plots	Capital cost	1,2	2	1	0.013	*5.5%*	*94.5%*				#NAME?	0	#NAME?					
ENV_19	Environmental	Loss of good quality agricultural lands and/or hindrance to the efficient workings of these lands and current agricultural practices	Cost of providing mitigation measures/ agricultural connection between severed plots	Capital cost	5,6	5	3	0.170	*60.0%*	*40.0%*				#NAME?	0	#NAME?					
ENV_20	Environmental	Loss of good quality agricultural lands and/or hindrance to the efficient workings of these lands and current agricultural practices	Cost of providing mitigation measures/ agricultural connection between severed plots	Capital cost	3,4	3	2	0.045	*20.0%*	*80.0%*				#NAME?	0	#NAME?					
ENV_21	Environmental	Loss of flood storage	Cost of providing compensatory excavation	Capital cost	1	5	4	0.340	*60.0%*	*40.0%*				#NAME?	0	#NAME?					

Risk ID	Work Package or Discipline	Cause	Effect/Risk Description	Risk Type (e.g. Cost, Programme, Safety)	Option	Partially Mitigated Risk Rating			Probability		Severity			RiskAnalysis			Additional Mitigation Measures	Mitigation Target Date	Comments	Arup Monitor	Status
					1/2/3, 4, 5, 6, ALL	Probability	Severity	Risk	P1	P0	Min	Likely	Max	Probability Distribution	Impact Distribution	Forced Sampling					
ENV_22	Environmental	Flood	Cost of flood management and mitigation measures	Capital cost	1	5	4	0.340	*60.0%*	*40.0%*				#NAME?	0	#NAME?					
TRF_01	Traffic Management	Holiday season affects traffic management during construction phase	Cost of alternative traffic management	Capital cost	2,3,4	4	2	0.065	*40.0%*	*60.0%*				#NAME?	0	#NAME?					
TRF_02	Traffic Management	Holiday season affects traffic management during construction phase	Cost of alternative traffic management	Capital cost	1,5,6	2	2	0.025	*5.5%*	*94.5%*				#NAME?	0	#NAME?					
TRF_03	Traffic Management	Holiday season affects traffic management during construction phase	Construction programme delay	Capital cost	2,3,4	5	4	0.340	*60.0%*	*40.0%*				#NAME?	0	#NAME?					
CON_01	Consultation	Closure of access roads unpopular with locals	Cost of providing alternative access	Capital cost	ALL	5	4	0.340	*60.0%*	*40.0%*				#NAME?	0	#NAME?					
CON_02	Consultation	Inadequate consultation with relevant Government agencies, local councils and the community	Scheme challenged leading to programme delay	Programme	ALL	2	4	0.100	*5.5%*	*94.5%*				#NAME?	0	#NAME?					
CON_03	Consultation	Availability of key statutory agencies for consultation	Programme delay	Programme	ALL	5	4	0.340	*60.0%*	*40.0%*				#NAME?	0	#NAME?					
CON_04	Consultation	Landowners/ CPO Difficulties	Protracted negotiations leading to programme delay	Programme	ALL	4	4	0.260	*40.0%*	*60.0%*				#NAME?	0	#NAME?					
STR_01	Structures	Inadequate definition of the highway	Additional structural requirements will be identified leading to increased capital costs	Capital cost	ALL	3	3	0.090	*20.0%*	*80.0%*											
STR_02	Structures	Inadequate land is acquired	Access constraints add cost and complexity to the design and construction processes	Capital cost	ALL	4	2	0.065	*40.0%*	*60.0%*											
STR_03a	Structures	Condition of existing structures is worse than reported or unexpected defects are uncovered	Additional remedial works to existing structures add to the design and construction costs	Capital cost	ALL	3	2	0.045	*20.0%*	*80.0%*											
STR_03b	Structures	Condition of existing structures is worse than reported or unexpected defects are uncovered	Additional remedial works to existing structures add to the design and construction costs	Programme	ALL	3	2	0.045	*20.0%*	*80.0%*											
STR_04a	Structures	Unexpected ground conditions (soft ground or contamination that has not been identified)	Additional design and construction costs	Capital cost	Offline	3	2	0.045	*20.0%*	*80.0%*											
STR_05a	Structures	Unexpected ground conditions (soft ground or contamination that has not been identified)	Additional design and construction costs	Capital cost	Online	2	2	0.025	*5.5%*	*94.5%*											
STR_04b	Structures	Unexpected ground conditions (soft ground or contamination that has not been identified)	Additional design and construction costs	Programme	Offline	3	2	0.045	*20.0%*	*80.0%*											
STR_05b	Structures	Unexpected ground conditions (soft ground or contamination that has not been identified)	Additional design and construction costs	Programme	Online	2	2	0.025	*5.5%*	*94.5%*											
STR_06a	Structures	Unexpected utilities encountered ie. diversion requirements that have not been identified	Additional design and construction costs and potentially delays on site to programme	Capital cost	Offline	2	1	0.013	*5.5%*	*94.5%*											
STR_07a	Structures	Unexpected utilities encountered ie. diversion requirements that have not been identified	Additional design and construction costs and potentially delays on site to programme	Capital cost	Online	3	2	0.045	*20.0%*	*80.0%*											
STR_06b	Structures	Unexpected utilities encountered ie. diversion requirements that have not been identified	Additional design and construction costs and potentially delays on site to programme	Programme	Offline	2	3	0.050	*5.5%*	*94.5%*											
STR_07b	Structures	Unexpected utilities encountered ie. diversion requirements that have not been identified	Additional design and construction costs and potentially delays on site to programme	Programme	Online	3	4	0.180	*20.0%*	*80.0%*											
STR_08	Structures	Updated standards being enforced subsequent to endorsement of AIPs	Additional design (and construction) work required	Commercial	ALL	3	2	0.045	*20.0%*	*80.0%*											
STR_09	Structures	Additional retaining structures will be identified for online option	Additional design and construction costs	Capital cost	Online	2	1	0.013	*5.5%*	*94.5%*											
STR_10	Structures	Errors will be identified in the existing structures Assessment Reports	Additional design and construction costs	Capital cost	ALL	2	1	0.013	*5.5%*	*94.5%*											

Appendix F

Assessment Summary Tables

Corridor 1: Western 2		-		**Present values of costs to public:** £39.6 million
Objective	***Sub-Objective***	***Qualitative Impacts***	***Quantitative Measure***	***Assessment***
Environment	Noise	• Temporary construction works and traffic noise impacts. • Introduction of new road traffic noise source to sensitive receivers across the River Main floodplain and along the B93. • Improvements in road traffic operating conditions and noise levels on the existing A26. • Generation of airborne noise from road traffic resulting in community annoyance and potential adverse effects on local biodiversity.	• 41 residences located within 300m of corridor.	Moderate adverse
	Air	• Changes to micro-climate along and in the immediate vicinity of the new roadway – e.g. potential decrease in local air quality along the new roadway due to the introduction of motor vehicle emissions into this part of the local airshed, i.e. NO_x, SO_x, CO, CO2, benzene, 1/3 butadiene, $PM_{10.}$ • Possible improvements to the local air quality of properties straddling the existing A26 due to discernible reductions in the volume of motor vehicle traffic travelling along this route and alleviation of major traffic congestion problems, particularly during peak times and holiday periods. • Generation of fugitive dust episodes during road construction (i.e. bulk earthworks) affecting local residential properties and biodiversity values. • Construction exhaust emissions from diesel powered construction plant and equipment / site vehicles / road pavement laying machinery and from motor vehicles travelling along the new roadway once operational.	• 27 residences located within 200m of corridor.	Moderate adverse

	Greenhouse Gases	• Local contributions to global climate change via the emissions of CO_2 from road vehicles travelling along the new / existing A26 corridor. • Improvements to traffic flow conditions / less congestion during peak times and holiday periods leading to reduced levels of CO_2 emissions based on existing traffic flows (although such benefits may be offset by future traffic growth). • Improvements in motor vehicle / fuel technologies.		Minor adverse
	Landscape/ Townscape	• Visual intrusion associated with the introduction of a new roadway constructed on structure / embankment above the existing floodplain to achieve the desired 1:100 year flood immunity level. • Loss and clearing of vegetation and the introduction of new bridge structures to cross the River Main and associated tributaries, and drainage infrastructure unsympathetic to the local landscape character and visual setting to provide suitable openings for the passage of floodwaters. • Incursions of new built elements into the “Glarryford Esker”. • Severance / loss of individual and copses of trees and some hedgerows. • Severance of raised bog areas, field patterns and rough improved / semi-improved pasture. • Major importation of fill material required to construct road embankments. • Avoids any direct disturbance to the “Frosses Trees” and the European designated Main Valley Bogs SAC / Frosses Bog ASSI. • Interruption of the openness of the River Main floodplain and disruption of immediate and panoramic views across / up and down the floodplain for local residents, visitors and travellers. • Alteration of existing landscape fabric and countryside setting.	• Moderate negative visual impact for approximately 32 properties within 300m of corridor.	Major adverse
		• Potential direct impacts associated with road construction on unknown buried / in-situ archaeological remains across the river Main floodplain. • No impact on the appearance /setting of listed buildings on historic landscapes.		Minor adverse
Heritage	Biodiversity	• Direct loss and clearance of high value ecological communities such as raised bog, floodplain mire, fen mire of interest to European and Schedule 1 Wildlife (NI) Order species. • Indirect impacts associated with road runoff and sedimentation, altered surface drainage and groundwater	• 13 ha of woodland potentially affected/lost • 1.4 ha of the Killycreen North SLNCI directly affected. • 3 possible main badger setts directly affected. • 4 Annex 1 / Schedule 1 (NI) Wildlife Order bird species potentially directly affected such as the whooper swan, fieldfare, redwing and kingfisher.	Major adverse

		patterns on the Main Valley Bogs SAC / Frosses Bog ASSI and other areas of raised bog. • Loss and displacement of protected fauna species (i.e. badgers, otters, marsh fritillary, common newt, common lizard) and their habitats due to roadworks & operation. • Fragmentation, degradation and delineation of habitats due to direct physical disturbance and "edge effects". • Introduction and formation of physical barriers that impede terrestrial fauna movements (i.e. badgers and otters) resulting in wildlife mortality (i.e. roadkill). • Impact on they hydrological regime and connectivity (i.e. surface and groundwater) of the Main Valley Bogs SAC & associated biodiversity interests and values. • Infestation and degradation of local biodiversity values due to the introduction and proliferation of weeds, artificial light intrusion, noise and air pollutant effects impacting on species behaviours, movements and breeding / feeding etc.	• Otter activity and field signs recorded in the vicinity of the Cloghmills Water / River Main confluence and likely to be present up and down the River Main channel.	
	Water Environment	• Significant development within the River Main floodplain resulting in an increased risk of pollution of local watercourses, permanent alteration to natural surafec drainage patterns and loss of flood storage areas and increased downstream flood risk • Increased river afflux particularly at watercourse crossings • Mobilisation / influx of particulate and dissolved contaminants from disturbed / exposed areas of ground (i.e. heavy metals, nutrients, pesticides etc). • Impact on local water quality / aquatic biota – (increased erosion, scouring, sedimentation & pollution). • Accidental release / spillage of HC-based fuel, oils or chemicals infiltrating to the groundwater due to a construction or road traffic accident during operation. • Introduction of new area of hard impervious surfaces increasing the velocity / volume of road runoff into the local water environment. • Obstructions to the passage of floodwaters due to the roadway and associated crossing structures.	• 7 potential river crossings required. • 12.27 ha of 1:100 year extent directly affected by corridor. • Approximately 2.1 km of corridor within 1:100 year floodplain	Major adverse
	Physical Fitness	• Potential loss of land resource and connectivity between scattered settlements / residential dwellings straddling the B93 and recreational facilities (i.e. recreational fishing spots along the River Main). • Opportunities available to integrate facilities for pedestrians and cyclists, and possibly equestrians. • Potential for pedestrian & cycle facilities along the existing A26 to be incorporated.		Minor beneficial

	Journey Ambience	• More enhanced free-flow driving conditions with a reduction in traffic congestion, particularly during peak times and holiday periods. • Improvement in road safety and driver's ability to travel at a speed consistent with the road's design standard reducing driver stress and anxiety. • Exposure to more panoramic views of the River Main floodplain and surrounding areas providing a greater sense of place. • Provision of adequate and high visibility road signage to maximise way-finding along this section of the A26.		Minor beneficial
Safety	Accidents	• Existing road has relatively poor accident record. Dualling scheme would improve design standards and limit private access onto the route to major junctions. Corridor is off-line construction so road safety during construction likely to be good.		Major beneficial
	Security	• Rural environment with little security issues.		Neutral
Economy	Public Accounts		PVC = £39.6 million	
	Transport Economic Efficiency		PVB = £75.9 million NPV = £35.7 million BCR = 1.9	
	Reliability	• Moderate benefits from reduced congestion resulting in improved journey times.		Moderate beneficial
	Wider Economic Impacts	• Not assessed at this stage		Not assessed
Accessibility	Corridor Values	• Not applicable		Not applicable
	Severance	• No designated footpaths or bridleways within study area. • Cyclists are not currently encouraged to use existing road.		Neutral
	Access to the Transport System	• Not assessed at this stage.		Not assessed
Integration	Transport Interchange	• Scheme would seek to include provision for park and share facility to formalise current uncontrolled arrangement.		Minor beneficial/ neutral
	Land Use Policy	• Against Conserving Peatlands Statement policy. • Against River Conservation Strategy policy.		Moderate adverse
	Other Government Policies	• Against PPS2 and PPS15. • Against Conservation (Natural Habitats) Regulations NI '95. • Against Draft Northern Area Plan 2010-2016. • Against Drainage (EIA) Regs (NI) 2001. • Against the Fisheries Act 1966 (amended 2001).		Moderate adverse

Corridor 2: Western 5		- -		**Present values of costs to public:** £37.6 million
Objective	***Sub-Objective***	***Qualitative Impacts***	***Quantitative Assessment***	***Assessment***
Environment	Noise	• Temporary construction works and traffic noise impacts. • Introduction of new road traffic noise source to sensitive receivers across the River Main floodplain. • Improvements in road traffic operating conditions and noise levels on the existing A26. • Generation & increase of airborne noise from road traffic resulting in community annoyance and potential adverse effects on local biodiversity.	• 57 residences located within 300m of corridor • Eastern and western boundaries of 12 residential properties entrapped	Minor adverse
	Air	• Changes to micro-climate along and in the immediate vicinity of the new roadway – e.g. potential decrease in local air quality along the new roadway due to the introduction of motor vehicle emissions into this part of the local airshed, i.e. NO_x, SO_x, CO, CO2, benzene, 1/3 butadiene, $PM_{10.}$ • Possible improvements to the local air quality of properties straddling the existing A26 due to discernible reductions in the volume of motor vehicle traffic travelling along this route and alleviation of major traffic congestion problems, particularly during peak times and holiday periods. • Generation of fugitive dust episodes during road construction (i.e. bulk earthworks) affecting local residential properties and biodiversity values. • Construction exhaust emissions from diesel powered construction plant and equipment / site vehicles / road pavement laying machinery and from motor vehicles travelling along the new roadway once operational.	• 45 residences located within 200m of corridor • Eastern and western boundaries of 12 residential properties entrapped	Minor adverse

	Greenhouse Gases	• Local contributions to global climate change via the emissions of CO_2 from road vehicles travelling along the new / existing A26 corridor. • Improvements to traffic flow conditions / less congestion during peak times and holiday periods leading to reduced levels of CO_2 emissions based on existing traffic flows (although such benefits may be offset by future traffic growth). • Improvements in motor vehicle / fuel technologies.		Minor adverse
	Landscape/ Townscape	• Visual intrusion associated with the introduction of a new roadway constructed on structure / embankment along the eastern edge of the existing floodplain to achieve the desired 1:100 year flood immunity level • Direct loss of agricultural land, severance hedgerows / hedgebanks. • Maintenance required of direct visual connections for travellers with local amenities provided at Logans retail facility and the 2 petrol filling stations located along the southbound carriageway of the existing A26.		Minor adverse
		• Potential direct impacts associated with road construction on unknown buried / in-situ archaeological remains where the corridor skirts and/or passes across the eastern edge of the River Main floodplain. • No impact on the appearance / setting of historic landscapes and local heritage features		Minor adverse
Heritage	Biodiversity	• Potential impacts on the hydrological processes connecting the Main Valley Bogs SAC • Impact on the eastern edge of the River Main Floodplain, thus impacting on its habitats, flora and fauna • Habitats of high ecological value including raised bog, floodplain and fen mire which also support protected species. • Potential impact on Schedule 1 protected birds known to inhabit the area. • Fragmentation, degradation and delineation of habitats due to direct physical disturbance and “edge effects”. • Introduction and formation of physical barriers that impede recorded badger movement pathways resulting in potential wildlife mortality (i.e. roadkill) without the provision of fauna-proof fencing and underpasses.	• 1 possible main badger sett directly affected. • 3 Annex 1 / Schedule 1 (NI) Wildlife Order bird species potentially directly affected such as the fieldfare, redwing and kingfisher. • Otter activity and field signs recorded in the vicinity of the Cloghmills Water / River Main confluence and could be using the Cloghmills Water.	Minor/moderate adverse
	Water Environment	• Incursions into the 1:100 year flood areas of the River Main and its associated tributaries (i.e. largely attributed to the crossing of the Cloghmills Water and a short extent of floodplain). • Impact on local water quality / aquatic biota – (increased	• 1 potential river crossings required. • 5.60 ha of 1:100 year extent directly affected by corridor. • 963 m of floodplain traversed	Minor adverse

		erosion, scouring, sedimentation & pollution). • Direct adverse impacts on thin belts of riparian habitat of the Cloghmills Water • Introduction of new area of hard impervious surfaces increasing the velocity / volume of road runoff into the local water environment.		
	Physical Fitness	• Potential loss of land resource within the road reserve and reduced connectivity between local residential dwellings and the Logans retail facility. • Opportunities available to integrate facilities for pedestrians and cyclists, and possibly equestrians.		Minor beneficial
	Journey Ambience	• More enhanced free-flow driving conditions with a reduction in traffic congestion, particularly during peak times and holiday periods. • Improvement in road safety and driver's ability to travel at a speed consistent with the road's design standard reducing driver stress and anxiety.		Minor beneficial
Safety	Accidents	• Existing road has relatively poor accident record. Dualling scheme would improve design standards and limit private access onto the route to major junctions. Corridor is 50% off-line construction so road safety during construction likely to be good.		Major/ moderate beneficial
	Security	• Rural environment with little security issues.		Neutral
Economy	Public Accounts		PVC = £37.6 million	
	Transport Economic Efficiency		PVB = £82.5 million NPV = £44.5 million BCR = 2.2	
	Reliability	• Moderate benefits from reduced congestion resulting in improved journey times.		Moderate beneficial
	Wider Economic Impacts	• Not assessed at this stage		Not assessed
Accessibility	Corridor Values	• Not applicable		Not applicable
	Severance	• No designated footpaths or bridleways within study area. • Cyclists are not currently encouraged to use existing road.		Neutral
	Access to the Transport System	• Not assessed at this stage.		Not assessed
Integration	Transport Interchange	• Scheme would seek to include provision for park and share facility to formalise current uncontrolled arrangement.		Minor beneficial/ neutral
	Land Use	• Against Conserving Peatlands Statement policy.		Moderate/ minor

	Policy	• Against River Conservation Strategy policy.		adverse
	Other Government Policies	• Against PPS2 and PPS15. • Against Conservation (Natural Habitats) Regulations NI '95. • Against Draft Northern Area Plan 2010-2016. • Against Drainage (EIA) Regs (NI) 2001. • Against the Fisheries Act 1966 (amended 2001).		Moderate/ minor adverse

Corridor 3: Western 6		**Description:** This corridor would deliver a dual carriageway that is largely more central to the existing A26 route for the section of the A26 between Glarryford and the junction with the B93 (Killagan Road). The only exception is a section of approximately 1 kilometre in the vicinity of the existing Cloghmills Water crossing, where the corridor deviates off-line to the west of the existing route. For the 1.5km section north of the A26/ B93 junction, the corridor would route off-line to the west, behind the residential properties. The dual carriageway would be approximately 7km in length. For the majority of the corridor it would seek to maximise the usage of the existing A26 highway infrastructure, minimising required land take. This corridor would have a limited impact upon the local farming community, with the main impact being severance for farms which work either side of the existing A26. This corridor would have a degree of impact upon existing properties.	**Problems:** Traffic management for construction of this largely more central corridor would be significant, and substantial disruption to traffic would be likely for the duration of the construction period. Ground conditions encountered would be a mixture of the poor ground to the west and the improved ground to the east. The corridor would therefore require some, limited ground improvement works. This corridor would have a degree of impact upon local properties.	**Present values of costs to public:** £36.5 million
Objective	***Sub-Objective***	***Qualitative Impacts***	***Quantitative Assessment***	***Assessment***
Environment	Noise	• Temporary construction works and traffic noise impacts. • Introduction of new road traffic noise source to sensitive receivers across the River Main floodplain. • Improvements in road traffic operating conditions and noise levels on the existing A26. • Generation & increase of airborne noise from road traffic resulting in community annoyance and potential adverse effects on local biodiversity.	• 58 residences located within 300m of corridor • Eastern and western boundaries of 3 residential properties entrapped	Minor adverse
	Air	• Changes to micro-climate along and in the immediate vicinity of the new roadway – e.g. potential decrease in local air quality along the new roadway due to the introduction of motor vehicle emissions into this part of the local airshed, i.e. NO_x, SO_x, CO, CO2, benzene, 1/3 butadiene, PM_{10}. • Possible improvements to the local air quality of properties straddling the existing A26 due to discernible reductions in the volume of motor vehicle traffic travelling along this route and alleviation of major traffic congestion problems,	• 50 residences located within 200m of corridor • Eastern and western boundaries of 3 residential properties entrapped	Minor adverse

		particularly during peak times and holiday periods. • Generation of fugitive dust episodes during road construction (i.e. bulk earthworks) affecting local residential properties and biodiversity values. • Construction exhaust emissions from diesel powered construction plant and equipment / site vehicles / road pavement laying machinery and from motor vehicles travelling along the new roadway once operational.		
	Greenhouse Gases	• Local contributions to global climate change via the emissions of CO_2 from road vehicles travelling along the new / existing A26 corridor. • Improvements to traffic flow conditions / less congestion during peak times and holiday periods leading to reduced levels of CO_2 emissions based on existing traffic flows (although such benefits may be offset by future traffic growth). • Improvements in motor vehicle / fuel technologies.		Minor adverse
	Landscape/ Townscape	• Visual intrusion associated with alterations to the existing drumlin landscape due to the significant cut / fill works required. • Direct loss of agricultural land, severance of mature and largely intact hedgerows / hedgebanks. • Introduction of new bridge structures and drainage infrastructure to cross local watercourses and maintain traverse drainage flows. • Loss of direct visual connections for travellers with local amenities provided at Logans retail facility and the 2 petrol filling stations located along the southbound carriageway of the existing A26. • Modification to the existing landscape grain, severance of properties and strong field pattern geometry. • Avoids direct contact with the “Frosses Trees”.		Major adverse
		• Potential direct impacts associated with road construction on unknown buried/in-situ archaeological remains • Potential impact on the physical appearance / setting of historic landscapes & the Cloghmills Conservation Area.		Moderate adverse
Heritage	Biodiversity	Direct loss and clearance of low value ecological communities such as improved grassland and isolated patches of raised bog directly abutting the southbound carriageway of the A26 in the vicinity of the Frosses Bog ASSI. • Indirect impacts associated with road runoff and sedimentation, altered surface drainage and groundwater patterns on the Main Valley Bogs SAC / Frosses Bog ASSI albeit situated adjacent to the northbound carriageway of the	• No direct loss of European / locally designated nature conservation sites. • Potential direct impacts on 1 main badger sett in the vicinity of the Frosses Bog. • 2 Annex 1 / Schedule 1 (NI) Wildlife Order bird species potentially directly affected such as fieldfare and redwing. • Potential otter activity along the Cloghmills Water.	Moderate adverse

		A26. • Loss and displacement of protected fauna species (i.e. badgers) and their habitats due to roadworks & operation. • Fragmentation, degradation and delineation of habitats due to direct physical disturbance and "edge effects". • Introduction and formation of physical barriers that impede recorded badger movement pathways resulting in potential wildlife mortality (i.e. roadkill) without the provision of fauna-proof fencing and underpasses. • Infestation and degradation of local biodiversity values due to the introduction and proliferation of weeds, artificial light intrusion, noise and air pollutant effects impacting on species behaviours, movements and breeding / feeding etc. • Direct impacts on the riparian habitats of the Cloghmills Water in the vicinity of the new bridge crossing.		
Water	Environment	• Minor incursions into the 1:100 year flood areas of the River Main and its associated tributaries (i.e. largely attributed to the crossing of the Cloghmills water and a short extent of floodplain). • Slight risk of increased river afflux at the new Cloghmills Water crossing. • Mobilisation / influx of particulate and dissolved contaminants from disturbed / exposed areas of ground (i.e. heavy metals, nutrients, pesticides etc). • Impact on local water quality / aquatic biota – (increased erosion, scouring, sedimentation & pollution). • Accidental release / spillage of HC-based fuel, oils or chemicals infiltrating to the groundwater due to a construction or road traffic accident during operation. • Introduction of new area of hard impervious surfaces increasing the velocity / volume of road runoff into the local water environment.	• Potentially 3 or more crossings of local watercourses required. • 3.95 ha of 1:100 year flood area directly affected by new corridor. • Approximately 0.7 km of corridor within 1:100 year floodplain	Minor adverse
	Physical Fitness	• Potential loss of land resource and connectivity between residential dwellings and the Logans retail facility straddling the existing A26 and the Old Frosses Road / B94. • Opportunities available to integrate facilities for pedestrians and cyclists, and possibly equestrians.		Minor beneficial
	Journey Ambience	• More enhanced free-flow driving conditions with a reduction in traffic congestion, particularly during peak times and holiday periods. • Improvement in road safety and driver's ability to travel at a speed consistent with the road's design standard reducing driver stress and anxiety. • Variation in views and alignment as it traverses an undulating drumlin landscape which will provide elevated		Minor beneficial

		views out over the River Main floodplain subject to intervening landform and vegetation. • Provision of adequate and high visibility road signage to maximise way-finding along this section of the A26.		
Safety	Accidents	• Existing road has relatively poor accident record. Dualling scheme would improve design standards and limit private access onto the route to major junctions. Corridor is on-line construction so road safety during construction is not likely to be as good as off-line widening.		Major/ Moderate beneficial
	Security	• Rural environment with little security issues.		Neutral
Economy	Public Accounts		PVC = £36.5 million	
	Transport Economic Efficiency		PVB = £80.6 million NPV = £43.6 million BCR = 2.2	
	Reliability	• Moderate benefits from reduced congestion resulting in improved journey times.		Moderate beneficial
	Wider Economic Impacts	• Not assessed at this stage		Not assessed
Accessibility	Corridor Values	• Not applicable		Not applicable
	Severance	• No designated footpaths or bridleways within study area. • Cyclists are not currently encouraged to use existing road.		Neutral
	Access to the Transport System	• Not assessed at this stage.		Not assessed
Integration	Transport Interchange	• Scheme would seek to include provision for park and share facility to formalise current uncontrolled arrangement.		Minor beneficial/ neutral

	Land Use Policy	• Corridor would impact upon the following land use policies (to a limited extent):
		  • Conserving Peatlands Statement policy.
		  • River Conservation Strategy policy.
				Minor adverse/ neutral

	Other Government Policies	• Against PPS2 and PPS15. • Against Conservation (Natural Habitats) Regulations NI '95. • Against Draft Northern Area Plan 2010-2016. • Against Drainage (EIA) Regs (NI) 2001. • Against the Fisheries Act 1966 (amended 2001).		Moderate/ minor adverse

Corridor 4: Central Corridor		**Description:** This corridor would deliver a dual carriageway that is largely more central to the existing A26 route for the whole of its length. The only exception is a section of approximately 1 kilometre in the vicinity of the existing Cloghmills Water crossing, where the corridor deviates off-line to the west of the existing route. The dual carriageway would be approximately 7km in length. The proposed corridor would seek to maximise the usage of the existing A26 highway infrastructure for the majority of its length, minimising required land take. This corridor would have a limited impact upon the local farming community, with the main impact being severance for farms which work either side of the existing A26. This corridor would have the most impact upon existing properties.	**Problems:** Traffic management for construction of this Central Corridor would be significant, and substantial disruption to traffic would be likely for the duration of the construction period. Ground conditions encountered would be a mixture of the poor ground to the west and the improved ground to the east. The corridor would therefore require some, limited ground improvement works. This corridor would have the greatest impact upon local properties.	**Present values of costs to public:** £34.8 million
Objective	***Sub-Objective***	***Qualitative Impacts***	***Quantitative Assessment***	***Assessment***
Environment	Noise	• Temporary construction works and traffic noise impacts • Potential discernible increases in existing levels of road traffic noise for properties with direct frontages onto the existing A26 and clustered in the vicinity of Logans retail facility. • Generation of airborne noise from road traffic resulting in community annoyance and potential adverse effects on local biodiversity. • Noise attenuation measures may need to be implemented such as natural barriers and noise walls.	• 68 residences located within 300m of corridor.	Moderate/ minor adverse
Air		• Changes to micro-climate along and in the immediate vicinity of the new roadway – e.g. potential decrease in local air quality along the new roadway due to the introduction of motor vehicle emissions into this part of the local airshed, i.e. NO_x, SO_x, CO, CO2, benzene, 1/3 butadiene, PM_{10} • Generation of fugitive dust episodes during road construction (i.e. bulk earthworks) settling onto residential dwellings straddling both sides of the existing A26 although the extent of the earthworks operation is likely to be significantly less than for any offline corridors proposed to the east / west of the existing A26. • Potential dust entrainment of local biodiversity values, particularly those associated with parts of the Frosses	• 55 residences located within 200m of corridor.	Minor adverse

		Bog ASSI, other areas of raised bog and the Frosses North SLNCI within 200m of the existing A26. • Construction exhaust emissions from diesel powered construction plant and equipment / site vehicles / road pavement laying machinery and from motor vehicles travelling along the new roadway once operational.		
	Greenhouse Gases	• Local contributions to global climate change via the emissions of CO_2 from road vehicles travelling along the new online A26 corridor. • Improvements to traffic flow conditions / less congestion during peak times and holiday periods leading to reduced levels of CO_2 emissions based on existing traffic flows (although such benefits may be offset by future traffic growth). • Improvements in motor vehicle / fuel technologies.		Minor adverse
	Landscape/ Townscape	• Visual intrusion associated with alterations to the existing drumlin landscape due to the significant cut / fill works required. • Direct loss of agricultural land, severance of mature and largely intact hedgerows / hedgebanks. • Introduction of new bridge structures and drainage infrastructure to cross local watercourses such as the Cloghmills Water and Killigan Water. • Maintenance of direct visual connections for travellers with local amenities provided at Logans retail facility and the 2 petrol filling stations located along the southbound carriageway of the existing A26. • Optimisation of existing road infrastructure reducing the physical extent of further intrusion into the surrounding landscape. • Better opportunities for integration and concealment of the upgraded roadway into the existing landscape. • Possible direct effects on the “Frosses Trees”, including the potential removal of the northern “Frosses Trees”. • Reduced amenity for local residents (i.e. private gardens) due to further strip acquisition requirements to facilitate the road upgrade works. • Potential degradation of the historic landscape setting for Dundermot Motte located approximately 400m west of the existing A26 a short distance to the north of the B64.		Moderate adverse
		• Potential direct impacts associated with road construction on unknown buried/in-situ archaeological remains in the immediate vicinity of the A26.		Moderate adverse

		• Impact on the appearance / setting of historic landscapes and local heritage features such as Dumdermot motte and Drumadoon House a listed building.		
	Biodiversity	• Direct loss and clearance of several small patches of raised bog which abut the existing A26. • Indirect impacts associated with road runoff and sedimentation on the Main Valley Bogs SAC / Frosses Bog ASSI. • Alteration of surface drainage patterns associated with the Frosses North SLNCI. • Disturbance and degradation of surrounding habitats i.e. "edge effects. • Direct loss albeit minor of riparian habitats straddling the Cloghmills Water and Killigan Water.	• 0.058 ha woodland potentially directly affected by the corridor. • No direct loss of European designated nature conservation sites. • Potential direct impacts on the Frosses North SLNCI. • Potential direct impacts on 2 main badger setts in the vicinity of the Frosses Bog and to the south of the Cloghmills Water. • 2 Annex 1 / Schedule 1 (NI) Wildlife Order bird species potentially directly affected such as fieldfare and redwing. • Potential otter activity along the Cloghmills Water	Moderate adverse
Water	Environment	• Increased risk of pollution of watercourses • Permanent alteration to natural drainage pattern • Loss of flood storage areas and risk of flooding • Increased river afflux particularly at watercourse crossings • Mobilisation/influx of particulate & dissolved contaminants from disturbed/exposed areas of ground (i.e. heavy metals, nutrients, pesticides etc) • Impact on local water quality/aquatic biota (i.e. increased erosion, scouring, sedimentation & pollution) • Accidental release/spillage of HC-based fuel, oils or chemicals infiltrating to the groundwater • Introduction of new area of hard impervious surfaces increasing the velocity/volume of road runoff • Obstructions to the passage of floodwaters due to the roadway & associated crossing structures	• 2.45 ha of 1:100 year flood area directly affected by the corridor. • Approximately 0.4 km of corridor length within 1:100 year floodplain. • At least 3 river crossings required	Minor adverse
	Physical Fitness	• Potential loss of land resource within the road reserve and reduced connectivity between local residential dwellings situated either side of the existing A26 and the Logans retail facility. • Opportunities available to integrate facilities for pedestrians and cyclists, and possibly equestrians.		Minor beneficial
	Journey Ambience	• More enhanced free-flow driving conditions with a reduction in traffic congestion, particularly during peak times and holiday periods. • Improvement in road safety and driver's ability to travel at a speed consistent with the road's design standard reducing driver stress and anxiety.		Minor beneficial
Safety	Accidents	• Existing road has relatively poor accident record.		Major/

		Dualling scheme would improve design standards and limit private access onto the route to major junctions. Corridor is on-line construction so road safety during construction is not likely to be as good as off-line widening.		Moderate beneficial
	Security	• Rural environment with little security issues.		Neutral
Economy	Public Accounts		PVC = £34.8 million	
	Transport Economic Efficiency		PVB = £83.0 million NPV = £48.2 million BCR = 2.4	
	Reliability	• Moderate benefits from reduced congestion resulting in improved journey times.		Moderate beneficial
	Wider Economic Impacts	• Not assessed at this stage		Not assessed
Accessibility	Corridor Values	• Not applicable		Not applicable
	Severance	• No designated footpaths or bridleways within study area. • Cyclists are not currently encouraged to use existing road.		Neutral
	Access to the Transport System	• Not assessed at this stage.		Not assessed
Integration	Transport Interchange	• Scheme would seek to include provision for park and share facility to formalise current uncontrolled arrangement.		Minor beneficial/ neutral

	Land Use Policy	• Corridor would impact upon the following land use policies (to a limited extent):
		  • Conserving Peatlands Statement policy.
		  • River Conservation Strategy policy.
				Minor adverse/ neutral

	Other Government Policies	• Against PPS2 and PPS15. • Against Conservation (Natural Habitats) Regulations NI ’95. • Against Draft Northern Area Plan 2010-2016. • Against Drainage (EIA) Regs (NI) 2001. • Against the Fisheries Act 1966 (amended 2001).		Moderate/ minor adverse

Corridor 5: Eastern 1		-		**Present values of costs to public:** £33.7 million
Objective	***Sub-Objective***	***Qualitative Impacts***	***Quantitative Assessment***	***Assessment***
Environment	Noise	• Temporary construction works and traffic noise impacts • Introduction of new road traffic noise source to sensitive receivers situated on agricultural land to the east of the existing A26 straddling the Old Frosses Road and the B94. • Improvements in road traffic operating conditions and noise levels on the existing A26 • Generation of airborne noise from road traffic resulting in community annoyance and potential adverse effects on local biodiversity. • Some natural noise attenuation provided where sections of the new roadway is in cutting.	• 54 residences located within 300m of corridor.	Moderate adverse
	Air	• Changes to micro-climate along and in the immediate vicinity of the new roadway – e.g. potential decrease in local air quality along the new roadway due to the introduction of motor vehicle emissions into this part of the local airshed, i.e. NO_x, SO_x, CO, CO2, benzene, 1/3 butadiene, PM_{10} • Possible improvements to the local air quality of properties straddling the existing A26 due to discernible reductions in the volume of motor vehicle traffic travelling along this route and alleviation of major traffic congestion problems, particularly during peak times and holiday periods. • Generation of fugitive dust episodes during road construction (i.e. bulk earthworks) affecting local residential properties and biodiversity values. • Construction exhaust emissions from diesel powered construction plant and equipment / site vehicles / road pavement laying machinery and from motor vehicles travelling along the new roadway once operational.	• 38 residences located within 200m of corridor.	Moderate adverse
	Greenhouse Gases	• Local contributions to global climate change via the emissions of CO_2 from road vehicles travelling along the new / existing A26 corridor.		Minor adverse

		• Improvements to traffic flow conditions / less congestion during peak times and holiday periods leading to reduced levels of CO_2 emissions based on existing traffic flows (although such benefits may be offset by future traffic growth). • Improvements in motor vehicle / fuel technologies.		
	Landscape/ Townscape	• Visual intrusion associated with alterations to the existing drumlin landscape due to the significant cut / fill works required. • Direct loss of agricultural land, severance of mature and largely intact hedgerows / hedgebanks. • Introduction of new bridge structures and drainage infrastructure to cross local watercourses and maintain traverse drainage flows. • Loss of direct visual connections for travellers with local amenities provided at Logans retail facility and the 2 petrol filling stations located along the southbound carriageway of the existing A26. • Modification to the existing landscape grain, severance of properties and strong field pattern geometry. • Avoids direct contact with the “Frosses Trees”.		Major adverse
		• Potential direct impacts associated with road construction on unknown buried/in-situ archaeological remains • Potential impact on the physical appearance / setting of historic landscapes & the Cloghmills Conservation Area.		Moderate adverse
Heritage	Biodiversity	Direct loss and clearance of low value ecological communities such as improved grassland and isolated patches of raised bog directly abutting the southbound carriageway of the A26 in the vicinity of the Frosses Bog ASSI. • Indirect impacts associated with road runoff and sedimentation, altered surface drainage and groundwater patterns on the Main Valley Bogs SAC / Frosses Bog ASSI albeit situated adjacent to the northbound carriageway of the A26. • Loss and displacement of protected fauna species (i.e. badgers) and their habitats due to roadworks & operation. • Fragmentation, degradation and delineation of habitats due to direct physical disturbance and “edge effects”. • Introduction and formation of physical barriers that impede recorded badger movement pathways resulting in potential wildlife mortality (i.e. roadkill) without the provision of fauna-proof fencing and underpasses. • Infestation and degradation of local biodiversity values due to the introduction and proliferation of weeds, artificial light	• No direct loss of European / locally designated nature conservation sites. • Potential direct impacts on 1 main badger sett in the vicinity of the Frosses Bog. • 2 Annex 1 / Schedule 1 (NI) Wildlife Order bird species potentially directly affected such as fieldfare and redwing. • Potential otter activity along the Cloghmills Water.	Moderate adverse

		intrusion, noise and air pollutant effects impacting on species behaviours, movements and breeding / feeding etc. • Direct impacts on the riparian habitats of the Cloghmills Water in the vicinity of the new bridge crossing.		
Water	Environment	• Minor incursions into the 1:100 year flood areas of the River Main and its associated tributaries (i.e. largely attributed to the crossing of the Cloghmills water and a short extent of floodplain). • Slight risk of increased river afflux at the new Cloghmills Water crossing. • Mobilisation / influx of particulate and dissolved contaminants from disturbed / exposed areas of ground (i.e. heavy metals, nutrients, pesticides etc). • Impact on local water quality / aquatic biota – (increased erosion, scouring, sedimentation & pollution). • Accidental release / spillage of HC-based fuel, oils or chemicals infiltrating to the groundwater due to a construction or road traffic accident during operation. • Introduction of new area of hard impervious surfaces increasing the velocity / volume of road runoff into the local water environment.	• Potentially 3 or more crossings of local watercourses required. • 3.95 ha of 1:100 year flood area directly affected by new corridor. • Approximately 0.7 km of corridor within 1:100 year floodplain	Minor adverse
	Physical Fitness	• Potential loss of land resource and connectivity between residential dwellings and the Logans retail facility straddling the existing A26 and the Old Frosses Road / B94. • Opportunities available to integrate facilities for pedestrians and cyclists, and possibly equestrians.		Minor beneficial
	Journey Ambience	• More enhanced free-flow driving conditions with a reduction in traffic congestion, particularly during peak times and holiday periods. • Improvement in road safety and driver's ability to travel at a speed consistent with the road's design standard reducing driver stress and anxiety. • Variation in views and alignment as it traverses an undulating drumlin landscape which will provide elevated views out over the River Main floodplain subject to intervening landform and vegetation. • Provision of adequate and high visibility road signage to maximise way-finding along this section of the A26.		Minor beneficial
Safety	Accidents	• Existing road has relatively poor accident record. Dualling scheme would improve design standards and limit private access onto the route to major junctions. Corridor comprises off-line construction so road safety during construction likely to be good.		Major beneficial
	Security	• Rural environment with little security issues.		Neutral
Economy	Public		PVC = £33.7 million	

	Accounts			
	Transport Economic Efficiency		PVB = £77.5 million NPV = £43.8 million BCR = 2.3	
	Reliability	• Moderate benefits from reduced congestion resulting in improved journey times.		Moderate beneficial
	Wider Economic Impacts	• Not assessed at this stage		Not assessed
Accessibility	Corridor Values	• Not applicable		Not applicable
	Severance	• No designated footpaths or bridleways within study area. • Cyclists are not currently encouraged to use existing road.		Neutral
	Access to the Transport System	• Not assessed at this stage.		Not assessed
Integration	Transport Interchange	• Scheme would seek to include provision for park and share facility to formalise current uncontrolled arrangement.		Minor beneficial/ neutral
	Land Use Policy	• Against River Conservation Strategy policy.		Minor adverse
	Other Government Policies	• Against Conservation (Natural Habitats) Regulations NI 1995. • Against Draft Northern Area Plan 2010-2016.		Minor adverse

Corridor 6: East – West	**Description:** This corridor would deliver a largely off-line dual carriageway that is off-line to the east of the existing A26 route for the majority of its length before crossing over to the west for the most northern section. The only exception would the most southern 1.5km of the corridor where it would be more central to the existing route. The dual carriageway would be 7.1km in length. The proposed corridor would largely utilise good quality agricultural land except where more central where it would seek to maximise the usage of the existing A26 highway infrastructure to minimise land take. This corridor would have a degree of impact upon existing properties.		**Present values of costs to public:** £39.3 million

Objective	***Sub-Objective***	***Qualitative Impacts***	***Quantitative Assessment***	***Assessment***
Environment	Noise	• Temporary construction works and traffic noise impacts • Introduction of new road traffic noise source to sensitive receivers situated on agricultural land to the east of the existing A26 straddling the Old Frosses Road and the B94. • Improvements in road traffic operating conditions and noise levels on the existing A26 • Generation of airborne noise from road traffic resulting in community annoyance and potential adverse effects on local biodiversity.	• 57 residences located within 30m of corridor	Moderate adverse
	Air	• Changes to micro-climate along and in the immediate vicinity of the new roadway – e.g. potential decrease in local air quality along the new roadway due to the introduction of motor vehicle emissions into this part of the local airshed, i.e. NO_x, SO_x, CO, CO2, benzene, 1/3 butadiene, PM_{10} • Possible improvements to the local air quality of properties straddling the existing A26 due to discernible reductions in the volume of motor vehicle traffic travelling along this route and alleviation of major traffic congestion problems, particularly during peak times and holiday periods. • Generation of fugitive dust episodes during road construction (i.e. bulk earthworks) affecting local residential properties and biodiversity values. • Construction exhaust emissions from diesel powered construction plant and equipment / site vehicles / road pavement laying machinery and from motor vehicles	• 38 residences located within 200m of corridor.	Moderate adverse

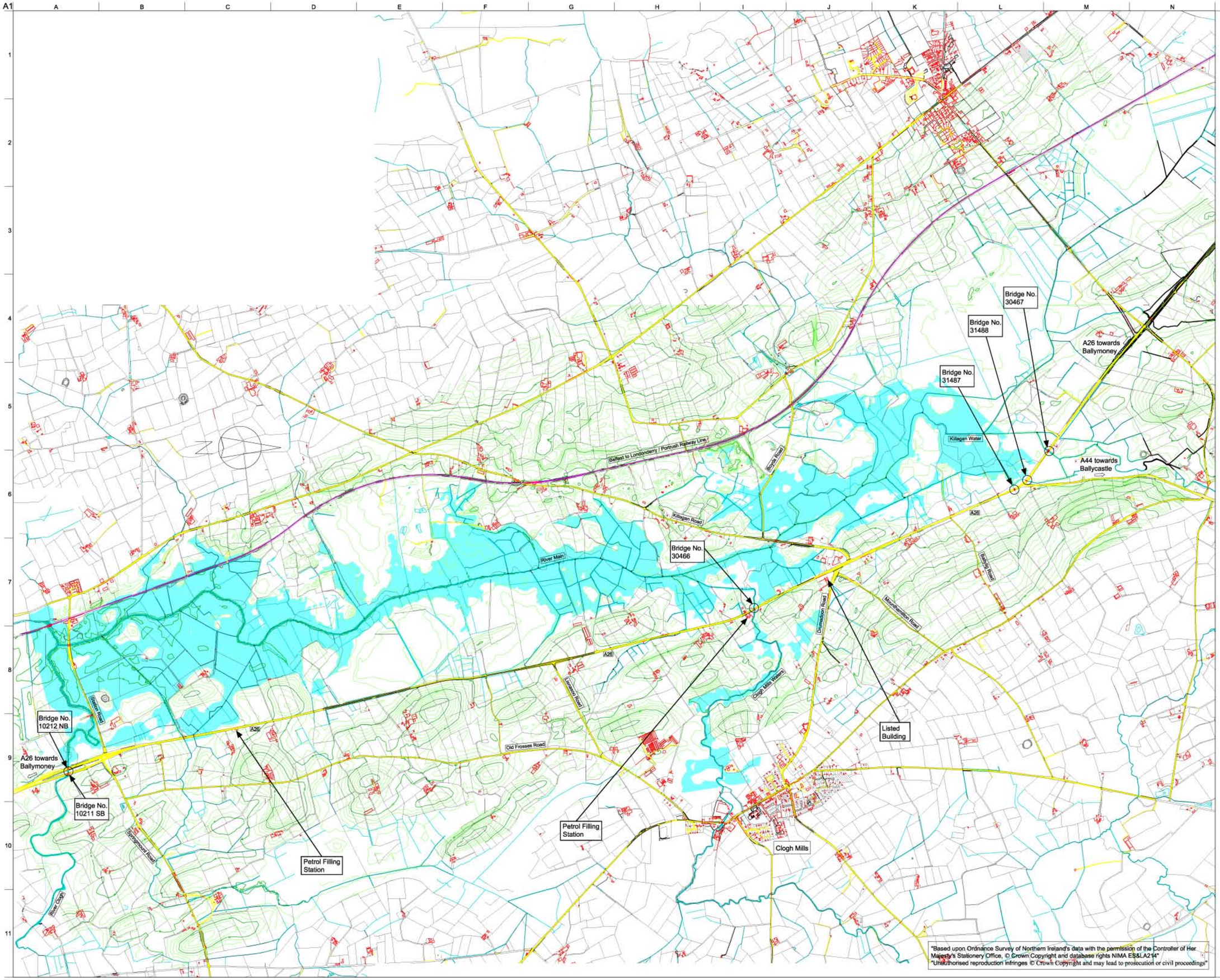
Objective	*Sub-Objective*	*Qualitative Impacts*	*Quantitative Assessment*	*Assessment*
		travelling along the new roadway once operational.		
	Greenhouse Gases	• Local contributions to global climate change via the emissions of CO_2 from road vehicles travelling along the new / existing A26 corridor. • Improvements to traffic flow conditions / less congestion during peak times and holiday periods leading to reduced levels of CO_2 emissions based on existing traffic flows (although such benefits may be offset by future traffic growth). • Improvements in motor vehicle / fuel technologies.		Minor adverse
	Landscape/ Townscape	• Visual intrusion associated with alterations to the existing drumlin landscape due to the significant cut / fill works required. • Direct loss of agricultural land, severance of mature and largely intact hedgerows / hedgebanks. • Introduction of new bridge structures and drainage infrastructure to cross local watercourses and maintain traverse drainage flows. • Loss of direct visual connections for travellers with local amenities provided at Logans retail facility and the 2 petrol filling stations located along the southbound carriageway of the existing A26. • Modification to the existing landscape grain, severance of properties and strong field pattern geometry. • Avoids direct contact with the “Frosses Trees”.		Major adverse
		• Potential direct impacts associated with road construction on unknown buried/in-situ archaeological remains • Potential impact on the physical appearance / setting of historic landscapes & the Cloghmills Conservation Area.		Moderate adverse
Heritage	Biodiversity	Direct loss and clearance of low value ecological communities such as improved grassland and isolated patches of raised bog directly abutting the southbound carriageway of the A26 in the vicinity of the Frosses Bog ASSI. • Indirect impacts associated with road runoff and sedimentation, altered surface drainage and groundwater patterns on the Main Valley Bogs SAC / Frosses Bog ASSI albeit situated adjacent to the northbound carriageway of the A26. • Loss and displacement of protected fauna species (i.e. badgers) and their habitats due to roadworks & operation. • Fragmentation, degradation and delineation of habitats due to direct physical disturbance and “edge effects”.	• No direct loss of European / locally designated nature conservation sites. • Potential direct impacts on 1 main badger sett in the vicinity of the Frosses Bog. • 2 Annex 1 / Schedule 1 (NI) Wildlife Order bird species potentially directly affected such as fieldfare and redwing. • Potential otter activity along the Cloghmills Water.	Moderate adverse

Objective	*Sub-Objective*	*Qualitative Impacts*	*Quantitative Assessment*	*Assessment*
		• Introduction and formation of physical barriers that impede recorded badger movement pathways resulting in potential wildlife mortality (i.e. roadkill) without the provision of fauna-proof fencing and underpasses. • Infestation and degradation of local biodiversity values due to the introduction and proliferation of weeds, artificial light intrusion, noise and air pollutant effects impacting on species behaviours, movements and breeding / feeding etc. • Direct impacts on the riparian habitats of the Cloghmills Water in the vicinity of the new bridge crossing.		
Water	Environment	• Minor incursions into the 1:100 year flood areas of the River Main and its associated tributaries (i.e. largely attributed to the crossing of the Cloghmills water and a short extent of floodplain). • Slight risk of increased river afflux at the new Cloghmills Water crossing. • Mobilisation / influx of particulate and dissolved contaminants from disturbed / exposed areas of ground (i.e. heavy metals, nutrients, pesticides etc). • Impact on local water quality / aquatic biota – (increased erosion, scouring, sedimentation & pollution). • Accidental release / spillage of HC-based fuel, oils or chemicals infiltrating to the groundwater due to a construction or road traffic accident during operation. • Introduction of new area of hard impervious surfaces increasing the velocity / volume of road runoff into the local water environment.	• Potentially 3 or more crossings of local watercourses required. • 3.95 ha of 1:100 year flood area directly affected by new corridor. • Approximately 0.7 km of corridor within 1:100 year floodplain	Minor adverse
	Physical Fitness	• Potential loss of land resource and connectivity between residential dwellings and the Logans retail facility straddling the existing A26 and the Old Frosses Road / B94. • Opportunities available to integrate facilities for pedestrians and cyclists, and possibly equestrians.		Minor beneficial
	Journey Ambience	• More enhanced free-flow driving conditions with a reduction in traffic congestion, particularly during peak times and holiday periods. • Improvement in road safety and driver's ability to travel at a speed consistent with the road's design standard reducing driver stress and anxiety. • Variation in views and alignment as it traverses an undulating drumlin landscape which will provide elevated views out over the River Main floodplain subject to intervening landform and vegetation. • Provision of adequate and high visibility road signage to		Minor beneficial

Objective	***Sub-Objective***	***Qualitative Impacts***	***Quantitative Assessment***	***Assessment***
		maximise way-finding along this section of the A26.		
Safety	Accidents	• Existing road has relatively poor accident record. Dualling scheme would improve design standards and limit private access onto the route to major junctions. Corridor comprises off-line construction so road safety during construction likely to be good.		Major beneficial
	Security	• Rural environment with little security issues.		Neutral
Economy	Public Accounts		PVC = £39.3 million	
	Transport Economic Efficiency		PVB = £81.6 million NPV = £39.2 million BCR = 2.1	
	Reliability	• Moderate benefits from reduced congestion resulting in improved journey times.		Moderate beneficial
	Wider Economic Impacts	• Not assessed at this stage		Not assessed
Accessibility	Corridor Values	• Not applicable		Not applicable
	Severance	• No designated footpaths or bridleways within study area. • Cyclists are not currently encouraged to use existing road.		Neutral
	Access to the Transport System	• Not assessed at this stage.		Not assessed
Integration	Transport Interchange	• Scheme would seek to include provision for park and share facility to formalise current uncontrolled arrangement.		Minor beneficial/ neutral
	Land Use Policy	• Against River Conservation Strategy policy and conserving peatlands statement.		Minor adverse
	Other Government Policies	• Against Conservation (Natural Habitats) Regulations NI 1995. • Against Draft Northern Area Plan 2010-2016. • Against PPS15. • Against Drainage (EIA) Regs (NI) 2001. • Against the Fisheries Act 1966 (amended 2001).		Minor adverse

Appendix G

Leaflet for ‘Route Improvement Corridor Options Public Consultation Event’



Legend

- Railway
- Bridges along A26
- Roads
- Water Courses
- Contours
- Buildings
- 1:100 Year Flood Level Mapping

Note:

Bridge Numbers are as supplied by Roads Service

Issue	Date	By	Chkd	Appd
P1	07/06/07	LTG	RC	SAH
STAGE 1 ASSESSMENT UPDATED				
P0	02/03/07	LTG	RC	SAH
STAGE 1 ASSESSMENT				

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Client

Roads Service NI
Northern Division

Job Title

A26 Dualling Glarryford to A44 Junction

Drawing Title

Map of Existing Features

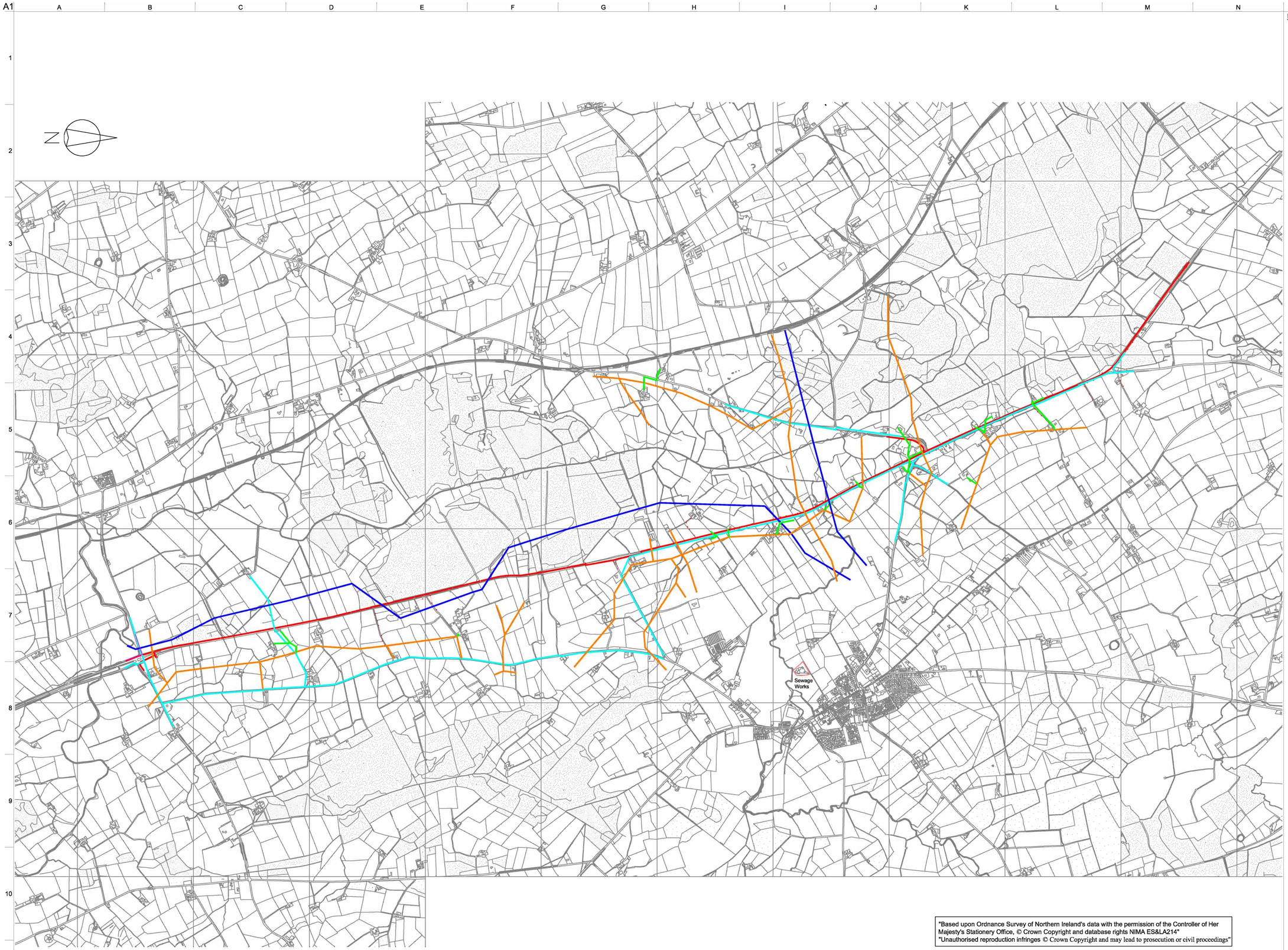
Scale at A1: 1: 12500

Plot ID: 3202E7B3-8BEC-4A6F-944B-C17ACCE33E45

Drawing Status: **Preliminary**

Job No	Drawing No	Issue
120429	A26-HWY-001	P1

A1



KEY

TELECOMMUNICATIONS
NTL PLANT
BT UNDERGROUND CABLES
BT OVERHEAD CABLES

WATER SERVICE
WATERMAINS
SEWAGE WORKS

NIE
11kV CABLES
33kV CABLES
MV CABLES

1. The Utility information shown is based upon the best interpretation of details supplied by each Statutory Undertaker. It should be noted that information is only indicative and as such cannot be considered accurate.

Issue	Date	By	Chkd	Appd
P0	03/11/06	MD	DMcS	CC
STAGE 1 ASSESSMENT				

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Client
Roads Service NI
Northern Division

Job Title
A26 Dualling - Glarryford to A44 Junction

Drawing Title
Existing Utility Services

Scale at A1 1:12500

Discipline

Drawing Status
Stage 1 Assessment

Job No	Drawing No	Issue
120429-00	**A26-HWY-002**	**P0**

Do not scale

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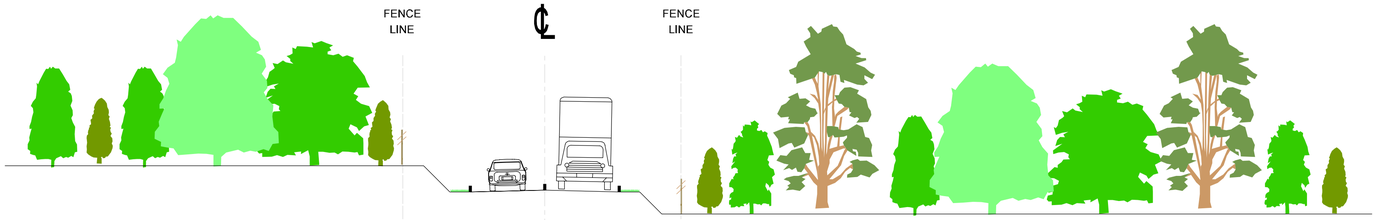
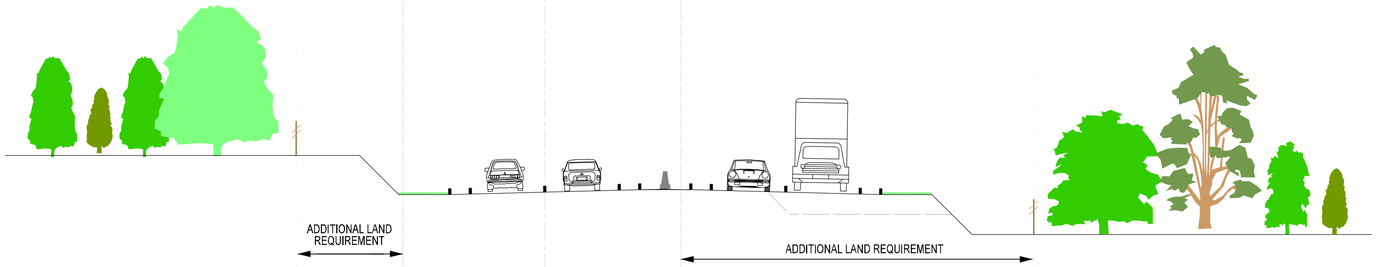
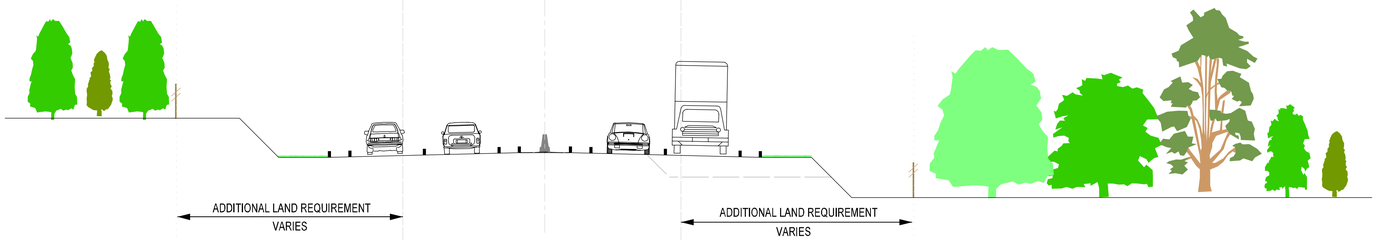


EXISTING S2 CARRIAGEWAY

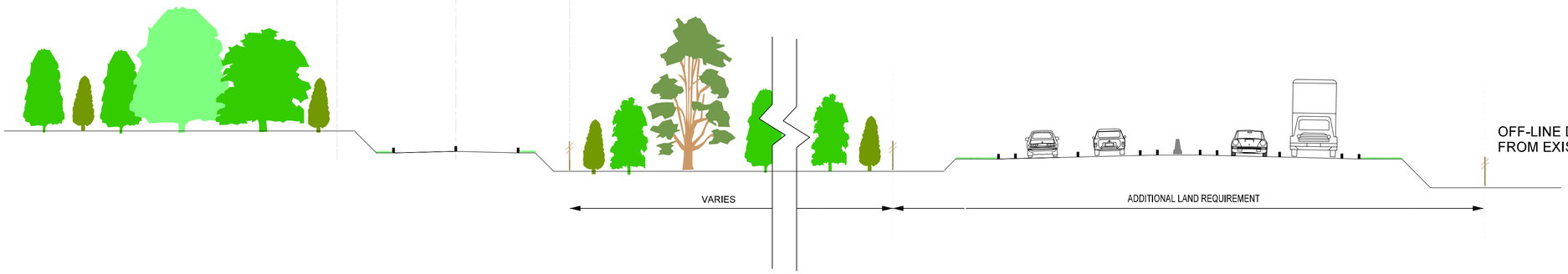


PARALLEL IMPROVEMENT TO D2 AP



CONSTRAINED IMPROVEMENT TO D2AP

OFF-LINE DUALLING TO D2AP CLOSE
TO EXISTING CARRIAGEWAY



OFF-LINE DUALLING TO D2AP AWAY
FROM EXISTING CARRIAGEWAY

Issue	Date	By	Chkd	Appd
P1	07/06/07	LTG	RC	SAH
	Revised for Draft 03			
P0	02/03/07	LTG	RC	SAH
	STAGE 1 ASSESSMENT			

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Client
Roads Service NI
Northern Division

Job Title
A26 Dualling - Glarryford
to A44 Junction

Drawing Title
Route Improvment Techniques

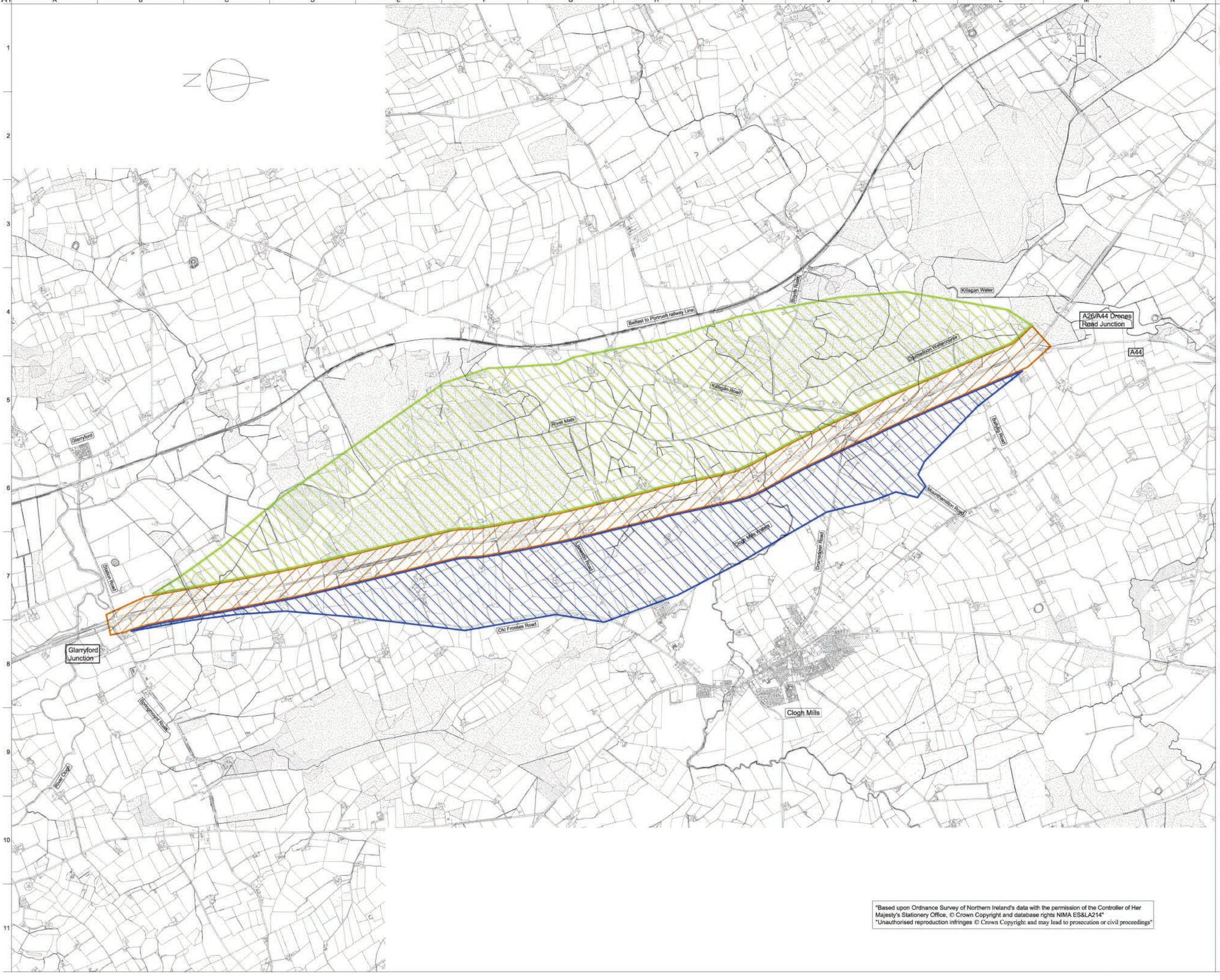
Scale at A1 N.T.S.

Plot ID

Drawing Status
Preliminary

Job No	Drawing No	Issue
120429-00	**A26-HWY-003**	**P1**

A1



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Issue	Date	By	Chkd	Appd
P1	07/06/07	LTG	RC	SAH
	STAGE 1 ASSESSMENT UPDATE			
P0	02/03/07	LTG	RC	SAH
	STAGE 1 ASSESSMENT			

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Client:
Roads Service NI
Northern Division

Job Title
A26 Dualling Glarryford to A44 Junction

Drawing Title
Route Improvement Assessment Areas

Scale at A1: 1: 12500

Plot ID: 7B1B885B-19F5-4DE9-AAC2-35FB717C24C4

Drawing Status
Preliminary

Job No	Drawing No	Issue
120429-00	A26-HWY-004	P1

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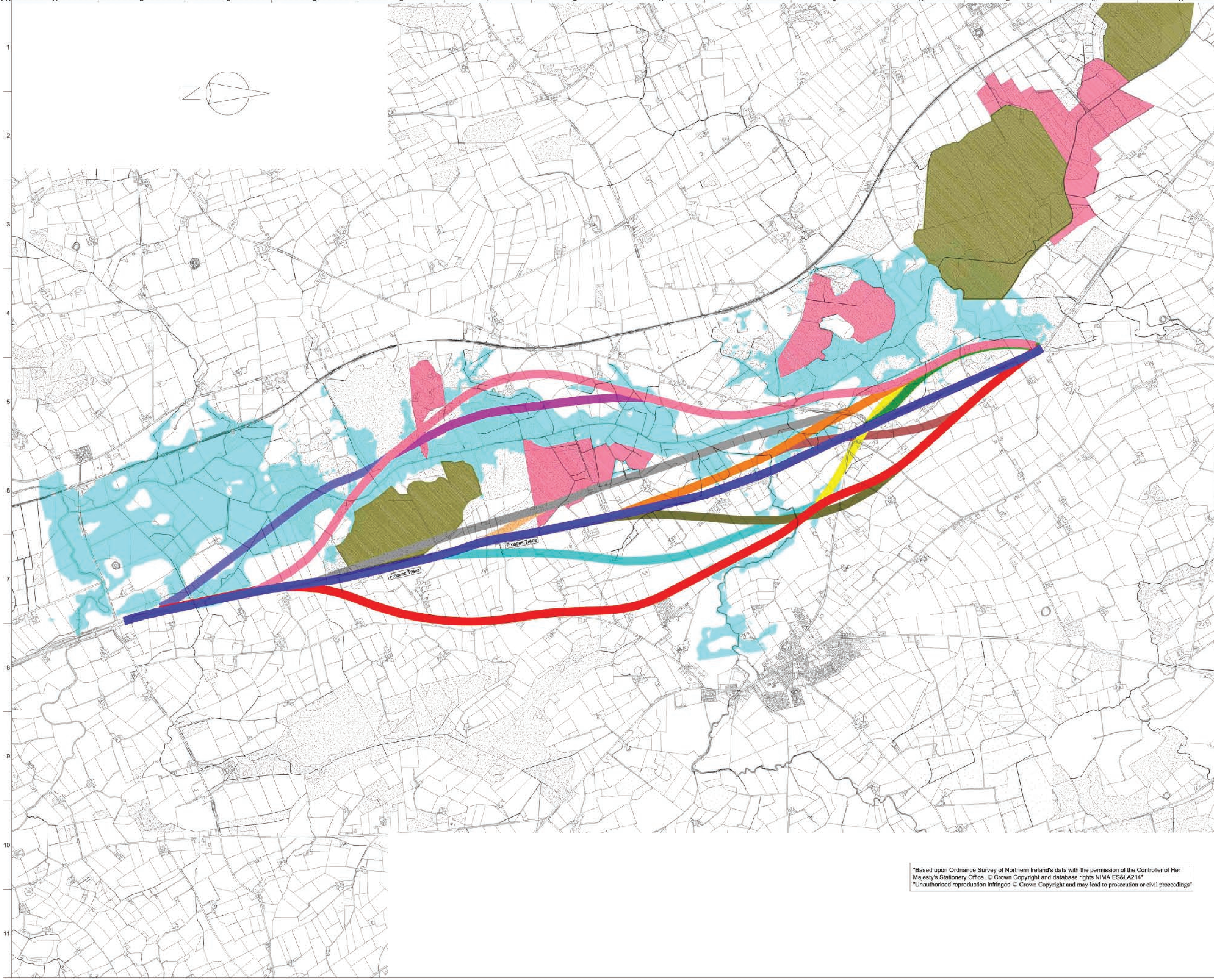

LEGEND

- Western 1 Corridor
- Western 2 Corridor
- Western 3 Corridor
- Western 4 Corridor
- Western 5 Corridor
- Western 6 Corridor
- Central Corridor
- Eastern 1 Corridor
- Eastern 2 Corridor
- Eastern 3 Corridor
- East to West Corridor
- West to East Corridor
- Main Valley Bogs SAC/ ASSI
- Sites of Local Nature Conservation Interest
- 1: 100 Year Flood Level Mapping

Issue	Date	By	Chkd	Appd
P1	07/06/07	LTG	RC	SAH
	STAGE 1 ASSESSMENT UPDATED			
P0	02/03/07	LTG	RC	SAH
	STAGE 1 ASSESSMENT			

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Client
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Northern Division

Job Title
A26 Dualling Glarryford to A44 Junction

Drawing Title
Initial Corridors Considered

Scale at A1 1: 12500

Plot ID 9DF58AD5-D3EC-4F15-8D1E-DE760E0A88E0

Drawing Status
Preliminary

Job No	Drawing No	Issue
120429-00	A26-HWY-005	P1

A1

LEGEND

- Western 2 Corridor
- Western 5 Corridor
- Western 6 Corridor
- Central Corridor
- Eastern 1 Corridor
- East to West Corridor
- Main Valley Bogs SAC/ ASSI
- Sites of Local Nature Conservation Interest
- 1: 100 Year Flood Level Mapping

Froses Trees

Froses Trees

Issue	Date	By	Chkd	Appd
P1	07/06/07	LTG	RC	SAH
	STAGE 1 ASSESSMENT UPDATED			
P0	02/03/07	LTG	RC	SAH
	STAGE 1 ASSESSMENT			

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Northern Division

Job Title
A26 Dualling Glarryford to A44 Junction

Drawing Title
Preferred Corridors

Scale at A1 1: 12500

Plot ID A7DA90BD-76AD-41FB-8EC1-61F210132137

Drawing Status
Preliminary

Job No	Drawing No	Issue
120429-00	A26-HWY-006	P1

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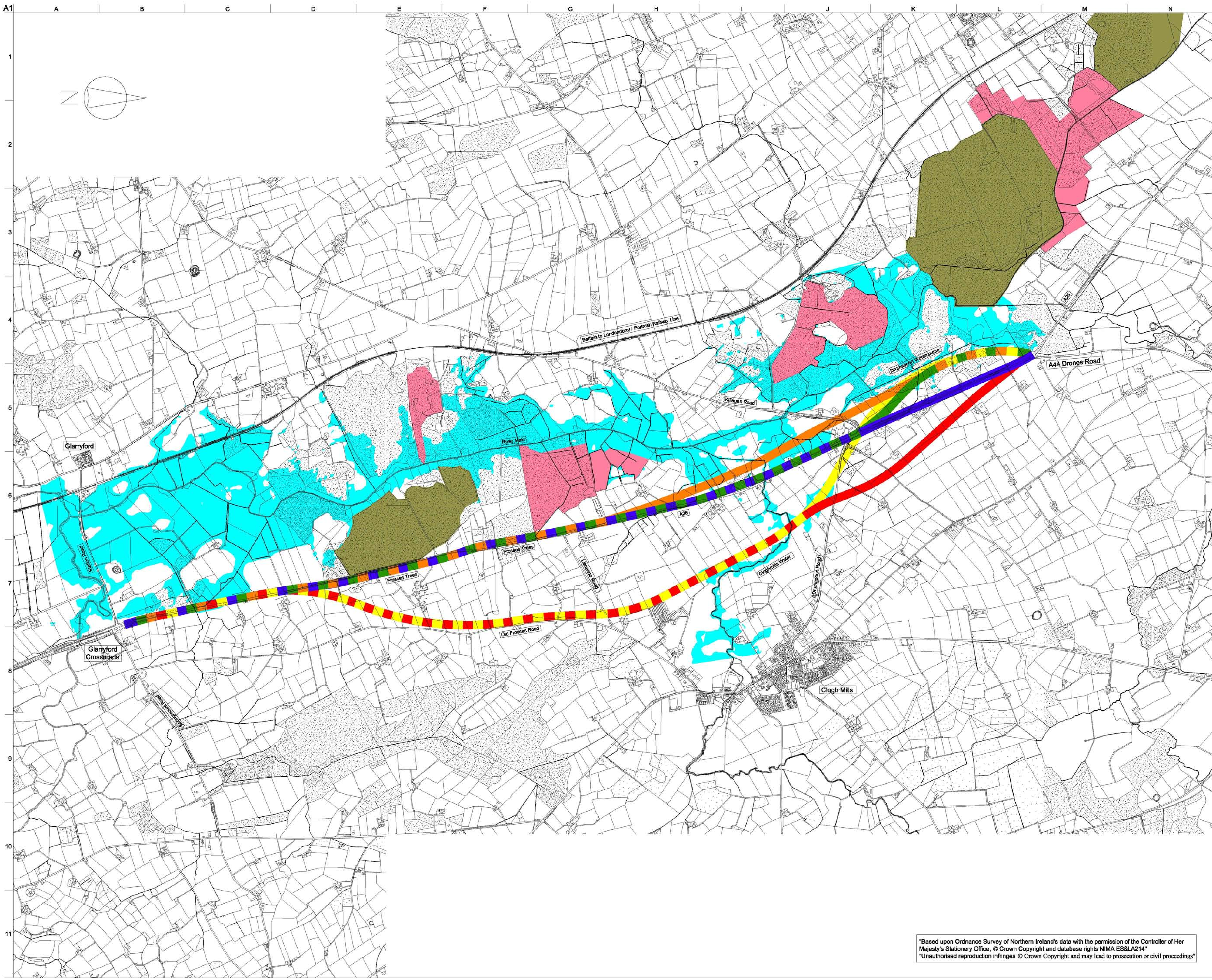

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LEGEND

- Option 1
- Option 2
- Option 3
- Option 4
- Option 5
- Main Valley Bogs SAC/ ASSI
- Sites of Local Nature Conservation Interest
- 1: 100 Year Flood Level Mapping

Issue	Date	By	Chkd	Appd
P1	06/09/07	LTG	RC	SAH
	Option descriptions updated			
P0	04/06/07	LTG	RC	SAH
	STAGE 1 ASSESSMENT			

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Client
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Job Title
A26 Dualling Glarryford to A44 Junction

Drawing Title
Corridors to be taken forward to Stage 2 Assessment

Scale at A1 1: 12500

Plot ID F142A850-86BB-4AED-B8B9-EEB84946F4FA

Drawing Status
Preliminary

Job No	Drawing No	Issue
120429-00	A26-HWY-009	P1

: Upper basalt formation (UBF)
: Lower basalt formation (LBF)
: Inter basaltic bed (IBB)
: Alluvium
: Peat
: Glaciofluvial Ice-contact deposits
: Hummocky glacial deposits and glacial tills
: Drumlins

: Springs
: Surface water course
: Eastern edge of aquifer
43NW29 : Borehole with GSN1 BH No.
A : Groundwater Abstraction borehole
B : Borewell
W : Well
: Mine entrance

: Fault
: Boundary of ASSI
K_ : Kettle Hole with reference number
K_ : Possible infilled Kettle Hole with reference number
G_ : Gravel pits with reference number
Gravel Pit 1906 : Gravel pits date information
MG_ : Made ground with reference number

Issue	Date	By	Chkd	Appd
P0	02/03/07	LTG	RC	SAH
	STAGE 1 ASSESSMENT			

Client
Roads Service NI
Northern Division

Job Title
A26 Dualling Glarryford
to A44 Junction

Drawing Title
Geotechnical Feature Plan

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Scale at A1 1:12500

Plot ID

Drawing Status
Preliminary

Job No	Drawing No	Issue
120429	A26-GEO-001	P0

A1

Legend

- Semi-Natural Broad Leaved Woodland
- Mixed Plantation Woodland
- Dense/Continuous Scrub
- SI Semi-improved Neutral Grassland
- RB Raised Bog
- Wet Dwarf Shrub Heathland
- Dry Modified Sphagnum Bog
- Fen Mire
- Q Quary
- Bare Ground
- A Arable
- I Improved Grassland
- Main Valley Bogs SAC / ASSI
- Sites of Nature Conservation Interest (SLNCI)
- Existing A26 Traffic Route
- Other Local Roads
- River Main + Assoaciated Tributeries
- Belfast to Portrush Railway
- Urban Areas
- Frosses Trees
- Flood - Plain Mire
- Wet Grassland
- Scattered Scrub

Dunloy
River Main Bog
Caldanagh Bog
The Isles
Dunloy Bog
Boyd's Bog
Killycreen North
River Main
Frosses North
Frosses Bog
Frosses Trees
Dundermot Motte
A26
Clogh Mills
N

J:\120000\120429-004\Internal Project Data\4-40 Calculations-Data\GIS\ArcGIS\OS base data\DGNA\26-ENV-001.dgn

Issue	Date	By	Chkd	Appd
P0	15/03/07	SA	AS	KC
Stage 1 Assessment				

Client
Roads Service NI
Northern Division

Job Title
A26 Dualling Glarryford
To A44 Junction

Drawing Title
Phase 1 Habitat Survey Plan

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Scale at A1 1:12500
Plot ID
Drawing Status **Preliminary**

Job No	Drawing No	Issue
120429	A26-ENV-001	P0

Urban Areas (Clogh Mills)

Best and most Versitle Land

River Main & Associated Tributaries

Boreholes

Water Quality Monitoring Stations

A26

Local Road Network

Belfast to Portrush Railway Line

Catchment area is within the Neegh/Bann International River Basin District (IRBD)

River Main:
- Nutrient Sensitive Area under Urban Waste Water Treatment Directive (91/271/EEC)
- Economically Significant under Freshwater Fish Directive (78/659/EEC)

River Clogh:
- Nutrient Sensitive Area Urban Waste Water Treatment Directive (91/271/EEC)
- Nitrate Vulnerable Zone under Nitrates Directive (91/676/EEC)
- Economically Significant under Freshwater Fish Directive (78/659/EEC)

Cloghmills Water:
- Nutrient Sensitive Area Urban Waste Water Treatment Directive (91/271/EEC)
- Economically Significant under Freshwater Fish Directive (78/659/EEC)

Dunloy

Ballymoney (9.5km)

Ballymena (10km)

Glarryford

Clogh Mills

B16

B93

B94

A26

A44 Drones Road

Killigan Water

River Main

Clogh Mills Water

River Clogh

Belfast to Portrush Railway line

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Drawing Title: **Best & Most Versatile Agricultural Land Plan**

A26-ENV-002 Scale @A3 1:25,000 Job No. 120429

LEGEND

1: 100 Year Flood Level Mapping

Issue	Date	By	Chkd	Appd
P0	02/03/07	LTG	RC	SAH
STAGE 1 ASSESSMENT				

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Client
Roads Service NI
Northern Division

Job Title
A26 Dualling Glarryford to A44 Junction

Drawing Title
1: 100 Year Flood Level Mapping

Scale at A1: 1: 12500

Plot ID: 4BF91895-BF44-472C-956A-2CA87B59B8DE

Drawing Status
Preliminary

Job No	Drawing No	Issue
120429-00	**A26-ENV-003**	**P0**

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Urban Areas (Clogh Mills)
Main Valley Bogs SAC / ASSI
Frosses Trees
Sites of Local Nature Conservation Interest
Private Woodland
1:100 Year Flood Level Mapping
Listed Buildings
Archaeological Sites
Historical Monuments
A26
Local Road Network
Belfast to Portrush Railway Line
River Main & Associated Tributaries
N
Dunloy
River Main Bog
Caldanagh Bog
Ballymoney (9.5km)
The Isles
Belfast to Portrush Railway line
A26
Dunloy Bog
B16
Boyd's Bog
B93
River Main
Killigan Water
A44 Drones Road
Killycreen North
Logans
A26
Glarryford
River Main
Frosses North
Drumadoon House
Garage
Frosses Bog
Dundermot Motte
B64
Filling Station
Clogh Mills Water
Frosses Trees
A26
Ballymena (10km)
Clogh Mills
River Clogh
B64
Lislaban

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Drawing Title: **Environmental Constraints Plan**

A26-ENV-010

Scale @A3 1:25,000

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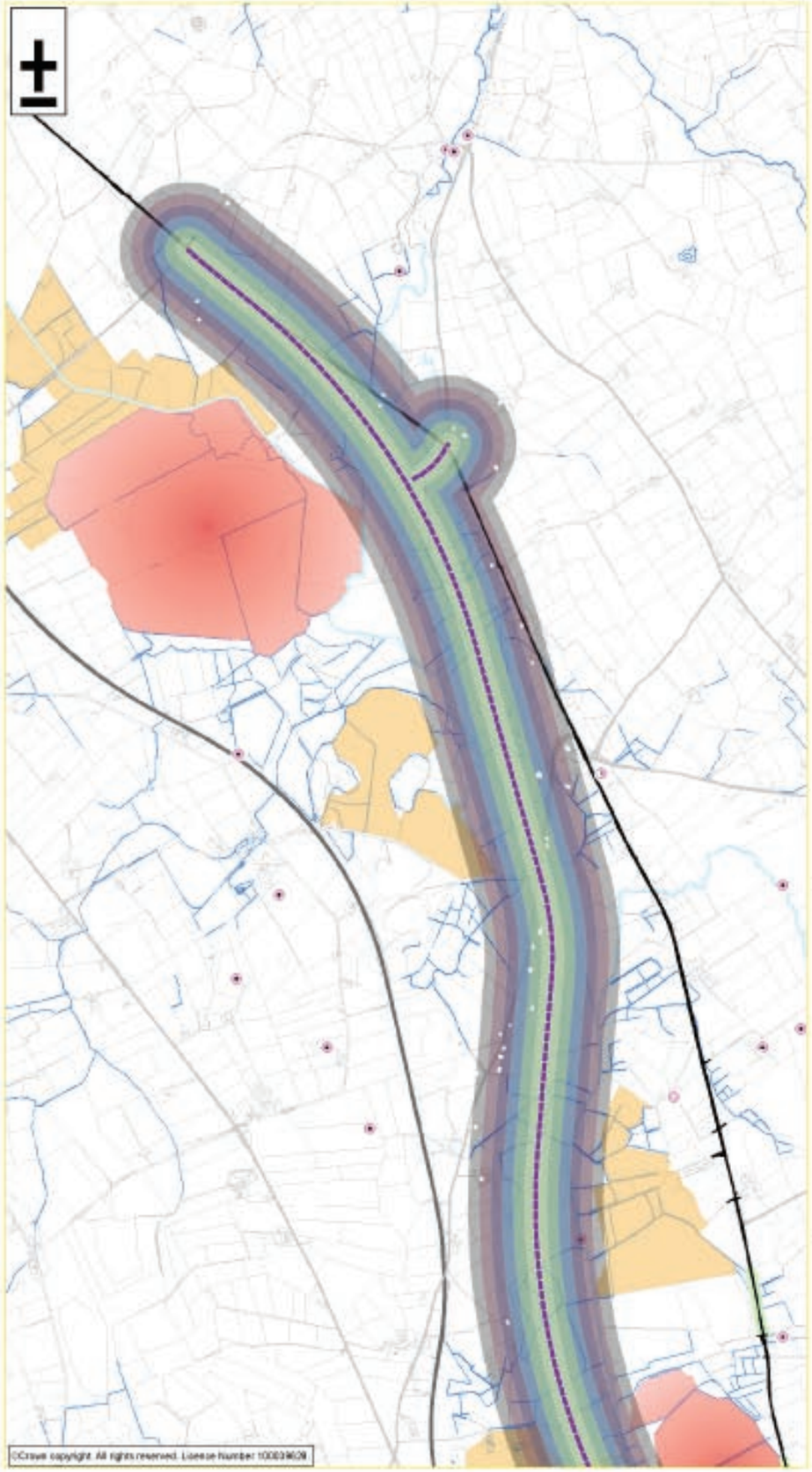

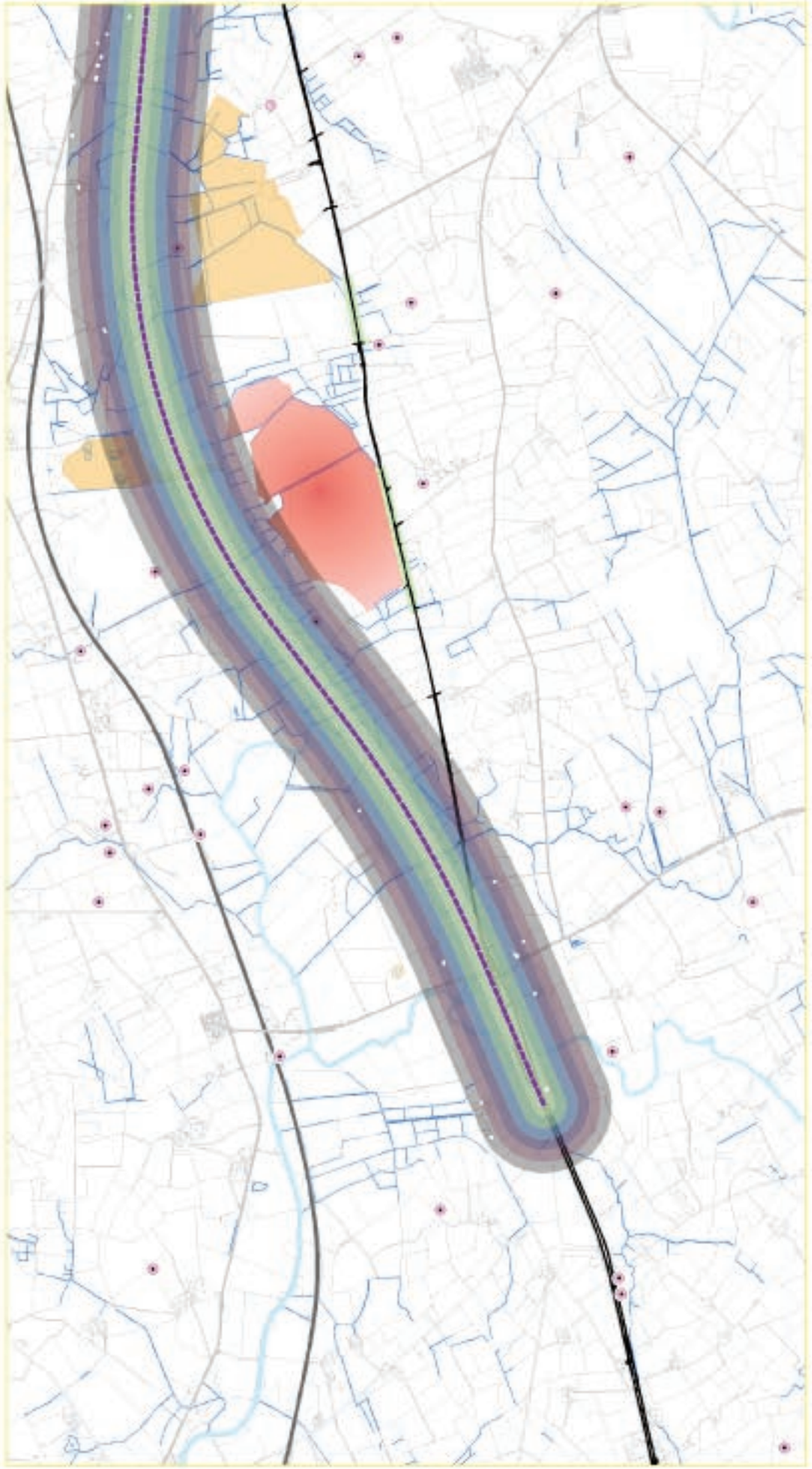

LEGEND

- Residential Properties
- H Sites of Cultural Heritage Importance
- Main Valley Bogs SAC / ASSI
- Dundermot Motte
- Frosses Trees
- Sites of Local Nature Conservation Interest
- Existing A26 Traffic Route
- Local Road Network
- Belfast to Portrush Railway Line
- River Main & Tributaries
- Western Route Option

Buffer	No. Properties
300m	42
250m	33
200m	27
150m	14
100m	10
50m	2

NOTES:

0 500 1,000 2,000
Metres

Scale Bar

Issue	Date	By	Chkd	Apprvd
P0	15/03/07	SA	AS	KC

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Client
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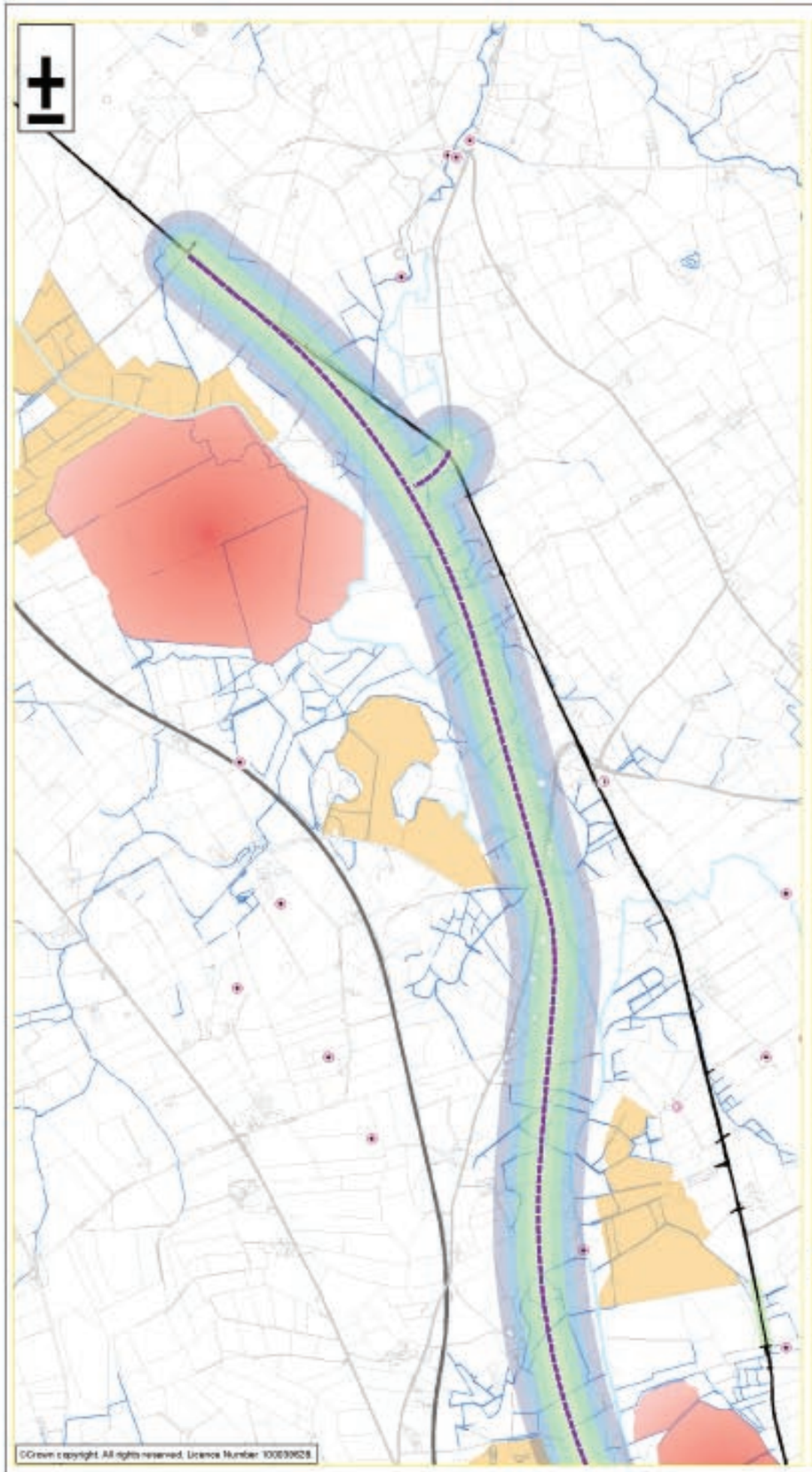
Job Title
A26 Dualling Glarryford To A44 Junction

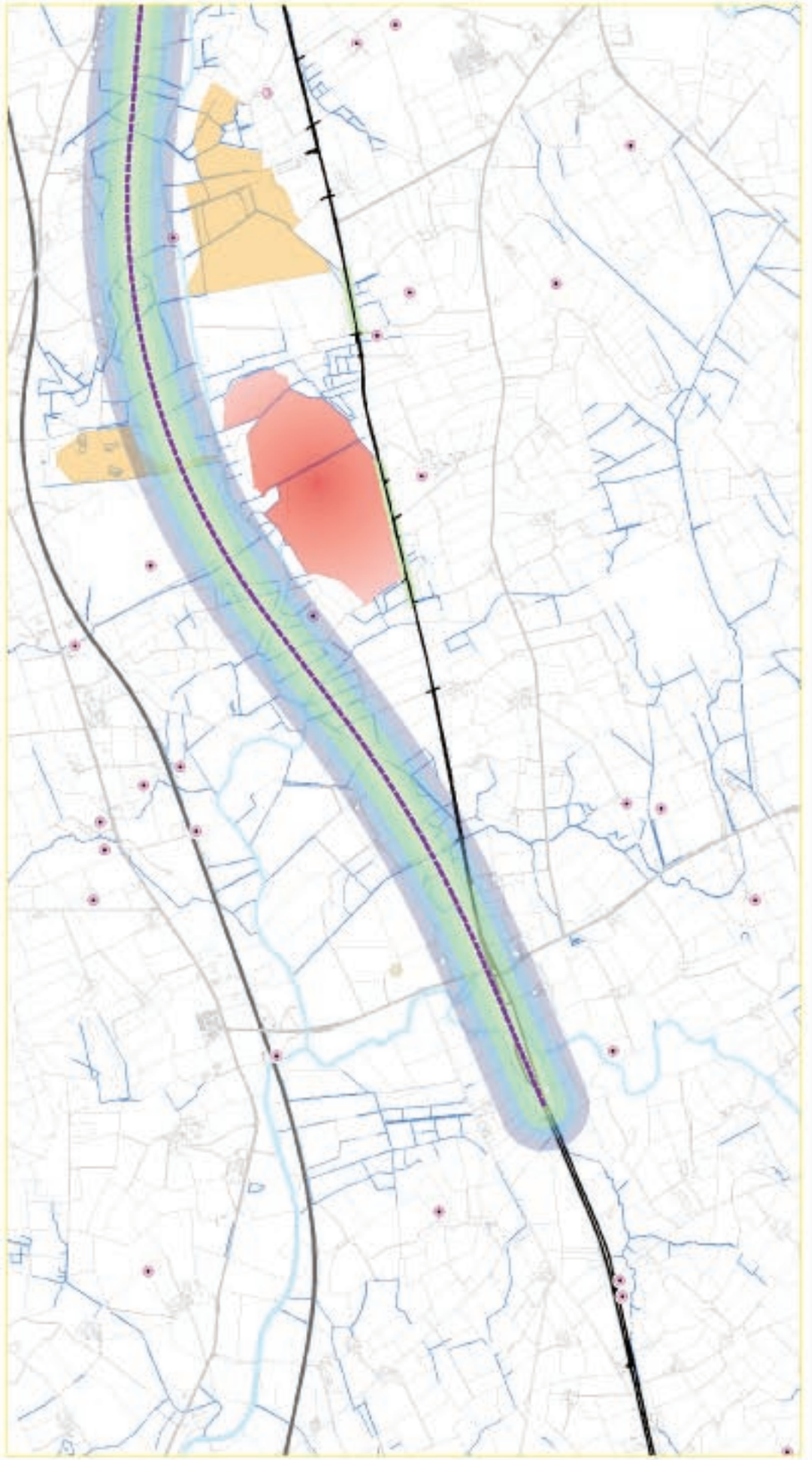
Drawing Title
Noise Sensitive Receptors - Western Corridor 2

Plot ID J:\120429-004-A0 Calculations-Data\GIS\ArcGIS\MapDocuments\Env Stage 1\A26-ENV-005

Scale at A3	Drawing Status
1:25,000	Preliminary

Job No.	Drawing No.	Issue
120429	A26-ENV-005	P0





LEGEND

- Residential Properties
- H Sites of Cultural Heritage Importance
- Main Valley Bogs SAC / ASSI
- Dundermot Motte
- Frosses Trees
- Sites of Local Nature Conservation Interest
- Existing A26 Traffic Route
- Local Road Network
- Belfast to Portrush Railway Line
- River Main & Tributaries
- Western Route Option

Buffer	No. Properties
200m	27
150m	14
100m	10
50m	2

NOTES:

0 490 980 1,960
Metres
Scale Bar

Issue	Date	By	Chkd	Apprvd
P0	15/08/07	SA	AS	KC

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Client
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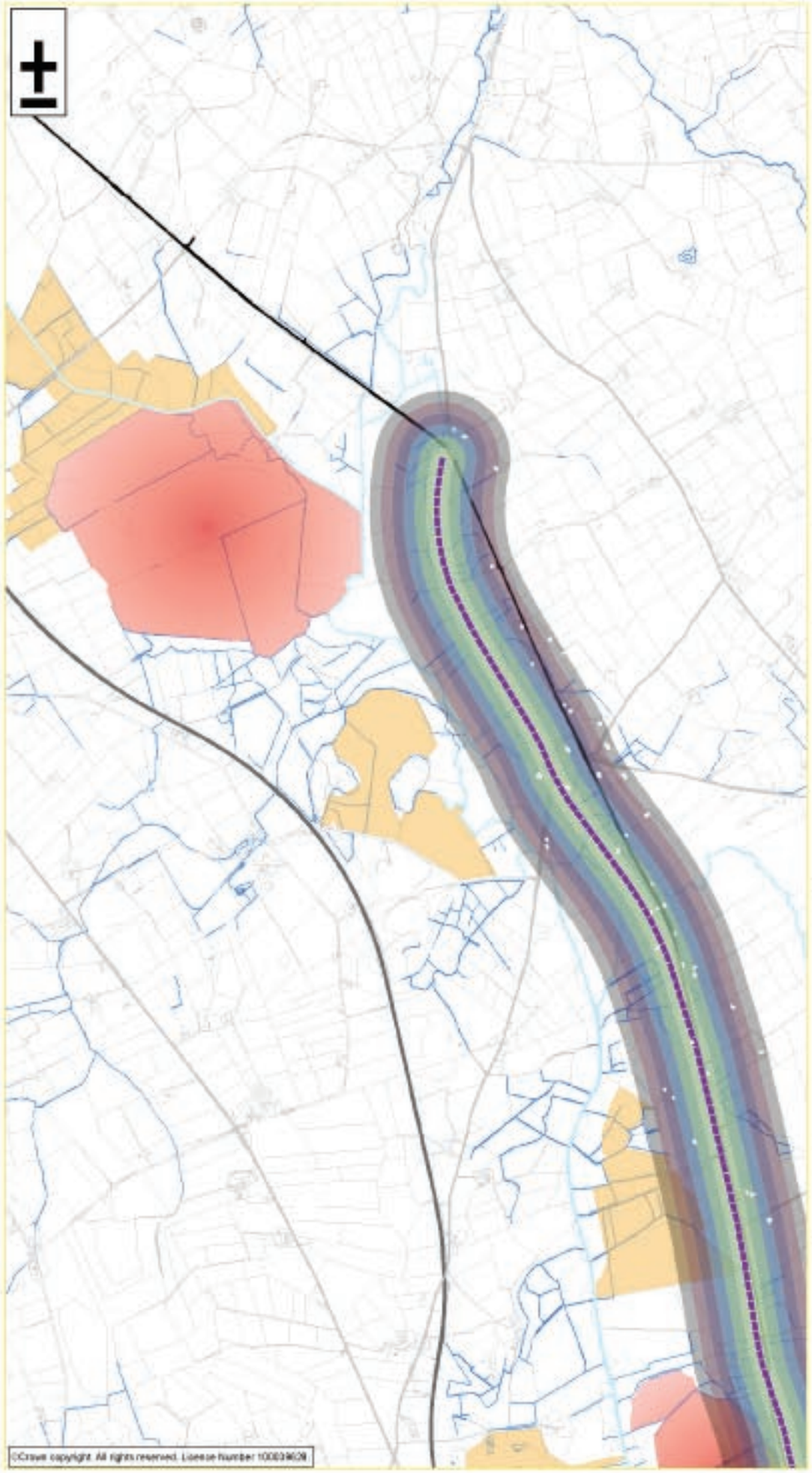
Job Title
A26 Dualling Glarryford To A44 Junction

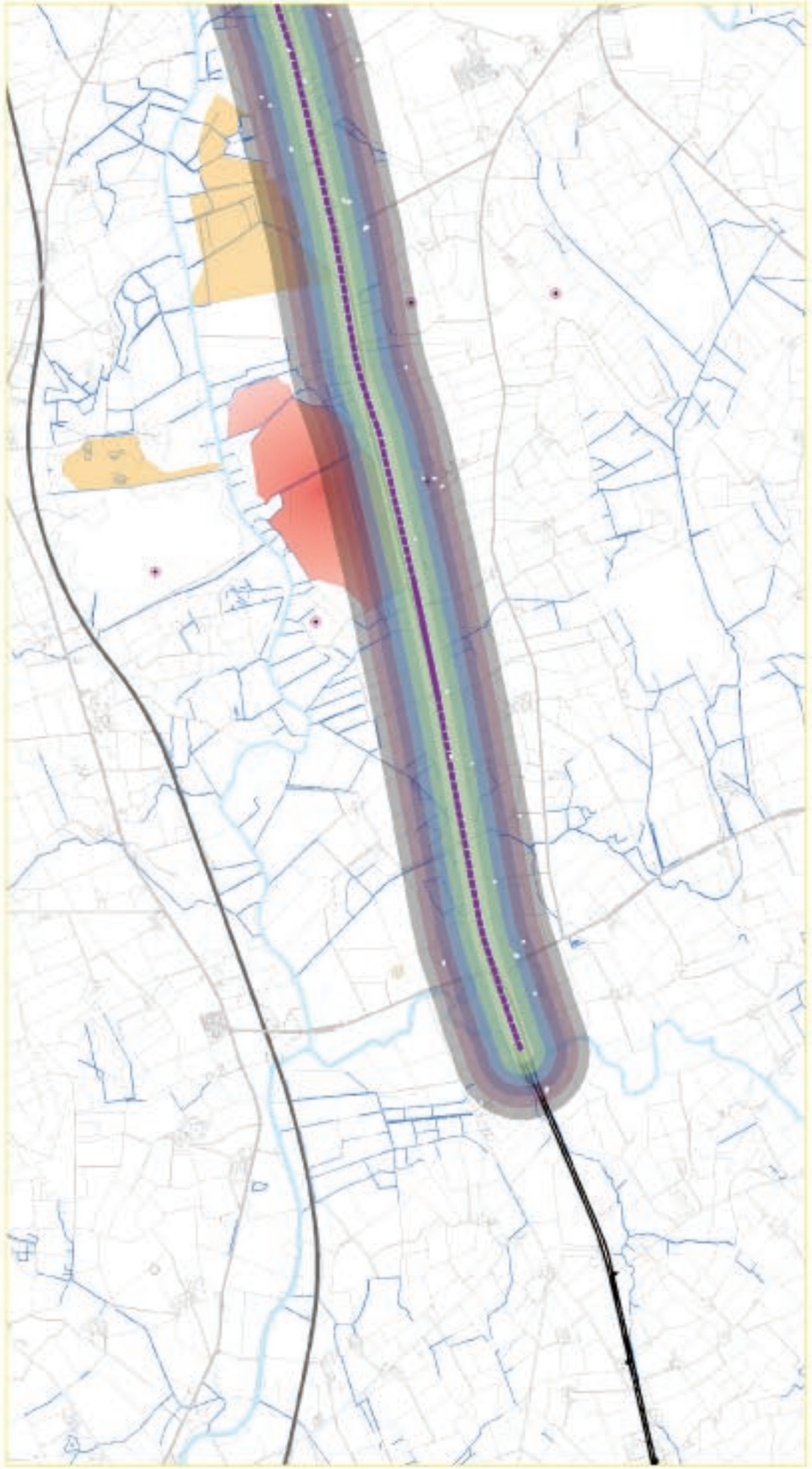
Drawing Title
Air Sensitive Receptors - Western Corridor 2

Plot ID J:\120429-00\4-40 Calculations-Data\GIS\Arc GIS\MapDocuments\Env Stage 1\A26-ENV-006

Scale at A3	Drawing Status
1:25,000	Preliminary

Job No.	Drawing No.	Issue
120429	A26-ENV-006	P0





LEGEND

- Residential Properties
- H Sites of Cultural Heritage Importance
- Main Valley Bogs SAC / ASSI
- Dundermot Motte
- Frosses Trees
- Sites of Local Nature Conservation Interest
- Existing A26 Traffic Route
- Local Road Network
- Belfast to Portrush Railway Line
- River Main & Tributaries
- Western Corridor 5

Buffer	No. Properties
300m	57
250m	49
200m	45
150m	32
100m	23
50m	12

NOTES:

0 500 1,000 2,000
Metres
Scale Bar

Issue	Date	By	Chkd	Apprvd
P0	15/03/07	SA	AS	KC

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Client
Roads Service NI, Northern Division

Job Title
A26 Dualling Glarryford To A44 Junction

Drawing Title
Noise Sensitive Receptors - Western Corridor 5

Plot ID J:\120429-004-40\Calculations-Data\GIS\ArcGIS\MapDocuments\Env Stage 1\A26-ENV-007

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Job No.	Drawing No.	Issue
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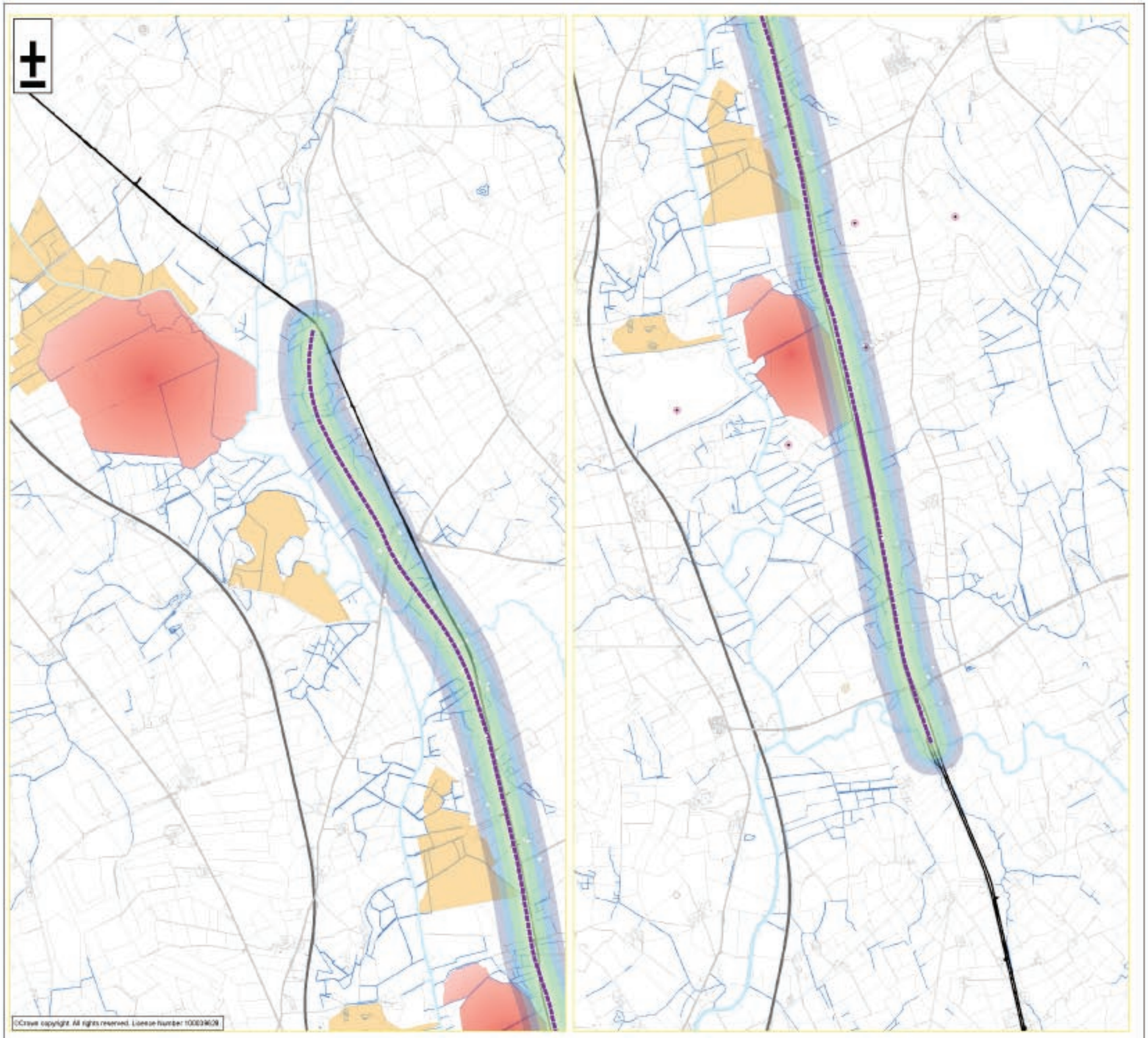

LEGEND

- Residential Properties
- H Sites of Cultural Heritage Importance
- Main Valley Bogs SAC / ASSI
- Dundermot Motte
- Frosses Trees
- Sites of Local Nature Conservation Interest
- Existing A26 Traffic Route
- Local Road Network
- Belfast to Portrush Railway Line
- River Main & Tributaries
- Western Corridor 5

Buffer	No. Properties
200m	45
150m	32
100m	23
50m	12

NOTES:

0 500 1,000 2,000
Metres
Scale Bar

Issue	Date	By	Chkd	Apprvd
P0	15/03/07	SA	AS	KC

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Client
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Job Title
A26 Dualling Glarryford To A44 Junction

Drawing Title
Air Sensitive Receptors - Western Corridor 5

Plot ID J:\120429-004-40\Calculations-Data\GIS\ArcGIS\MapDocuments\Env Stage 1\A26-ENV-007

Scale at A3	Drawing Status
1:25,000	Preliminary

Job No.	Drawing No.	Issue
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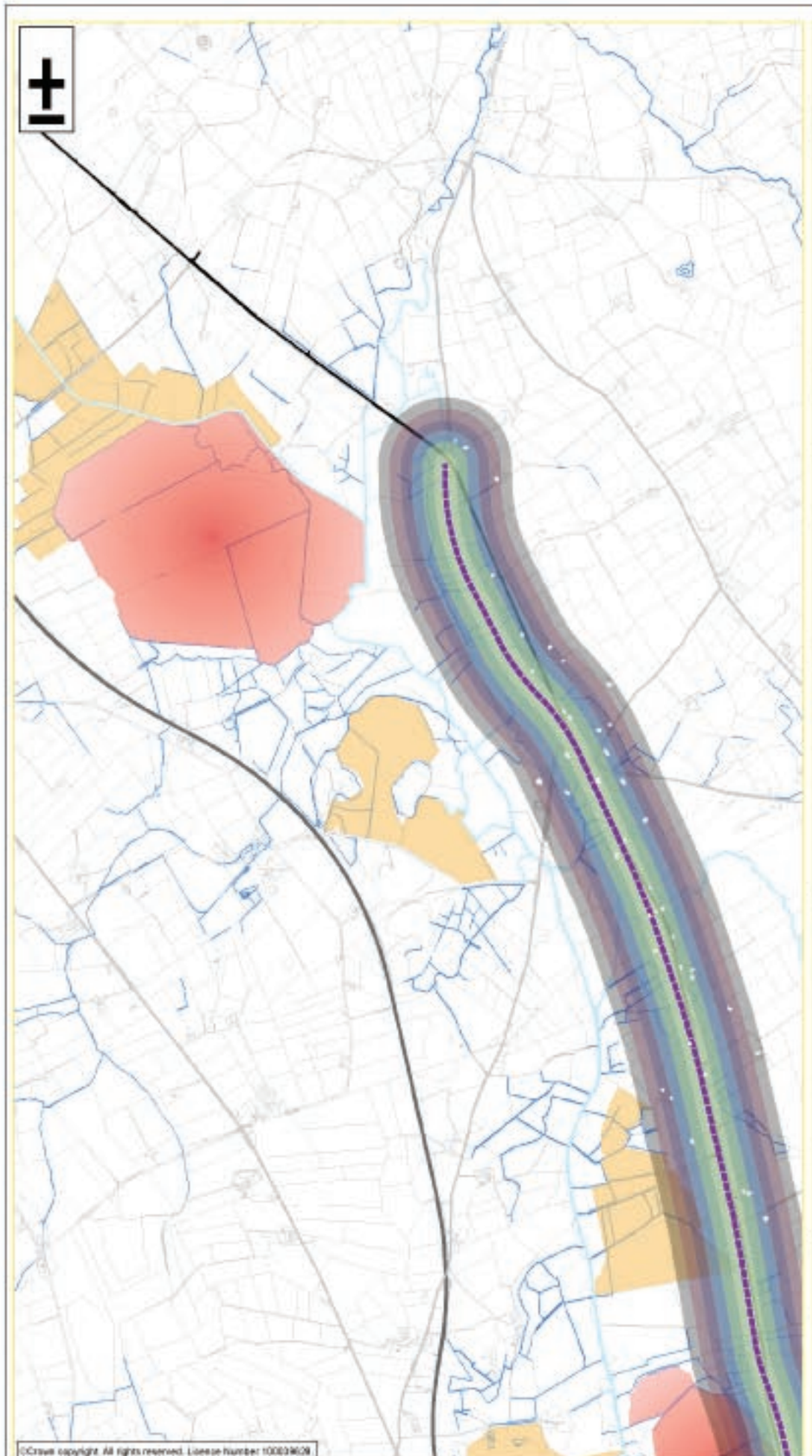

LEGEND

- Residential Properties
- H Sites of Cultural Heritage Importance
- Main Valley Bogs SAC / ASSI
- Dundermot Motte
- Frosses Trees
- Sites of Local Nature Conservation Interest
- Existing A26 Traffic Route
- Local Road Network
- Belfast to Portrush Railway Line
- River Main & Tributaries
- Western Corridor 6

Buffer	No. Properties
300m	58
250m	53
200m	50
150m	40
100m	21
50m	17

NOTES:

0 500 1,000 2,000
Metres

Scale Bar

Issue	Date	By	Chkd	Apprvd
P0	15/03/07	SA	AS	KC

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Client
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Job Title
A26 Dualling Glarryford To A44 Junction

Drawing Title
Noise Sensitive Receptors - Western Corridor 6

Plot ID J:\120429-004-40\Calculations-Data\GIS\ArcGIS\MapDocuments\Env Stage 1\A26-ENV-009

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1:25,000	**Preliminary**	
Job No.	Drawing No.	Issue
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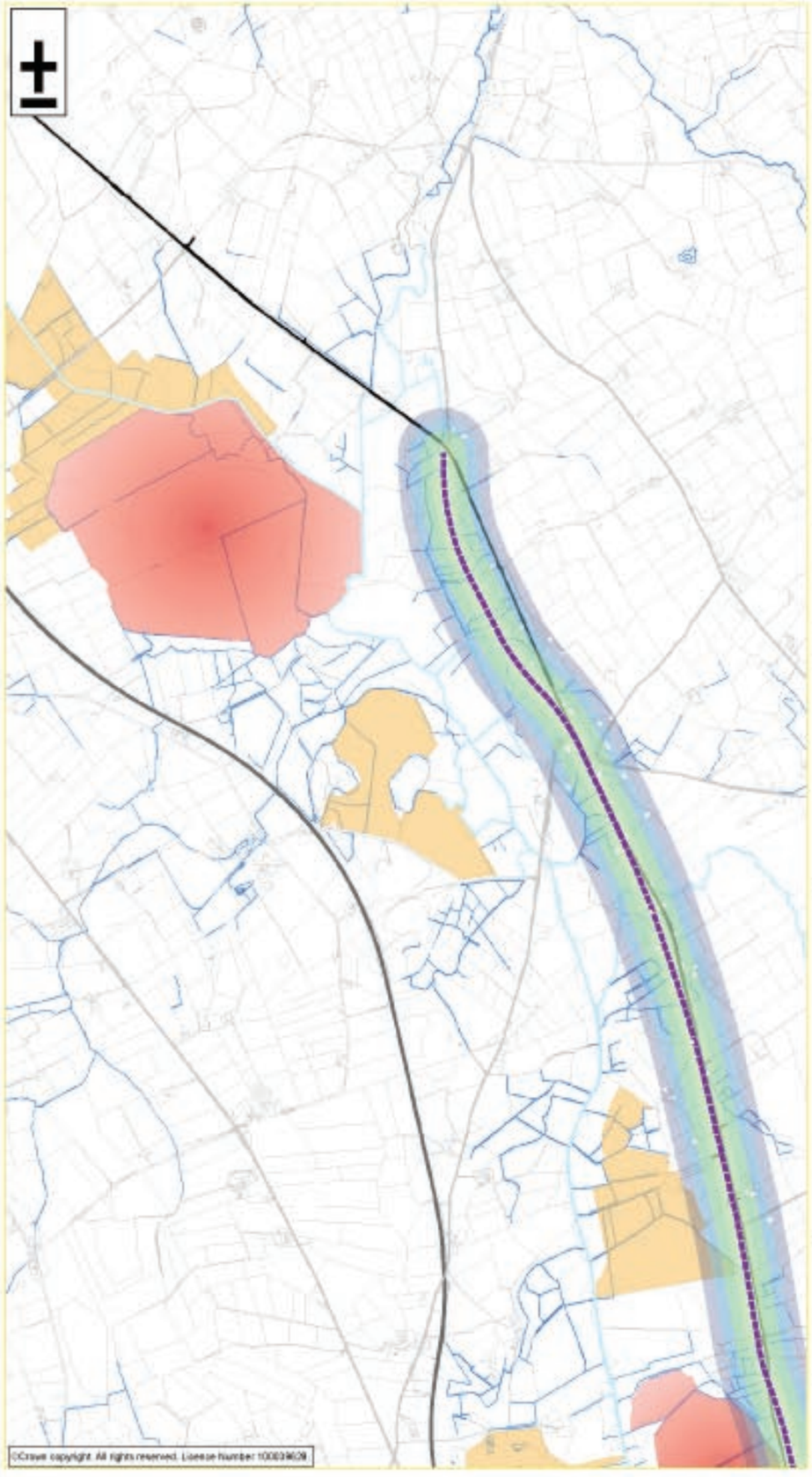

LEGEND

- Residential Properties
- H Sites of Cultural Heritage Importance
- Main Valley Bogs SAC / ASSI
- Dundermot Motte
- Frosses Trees
- Sites of Local Nature Conservation Interest
- Existing A26 Traffic Route
- Local Road Network
- Belfast to Portrush Railway Line
- River Main & Tributaries
- Western Corridor 6

Buffer	No. Properties
200m	50
150m	40
100m	21
50m	17

NOTES:

0 500 1,000 2,000
Metres
Scale Bar

Issue	Date	By	Chkd	Apprvd
P0	15/03/07	SA	AS	KC

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Client
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Job Title
A26 Dualling Glarryford To A44 Junction

Drawing Title
Air Sensitive Receptors - Western Corridor 6

Plot ID J:\120429-004 Internal Project Data\4-40 Calculations-Data\GIS\ArcGIS\Map Documents\Env026

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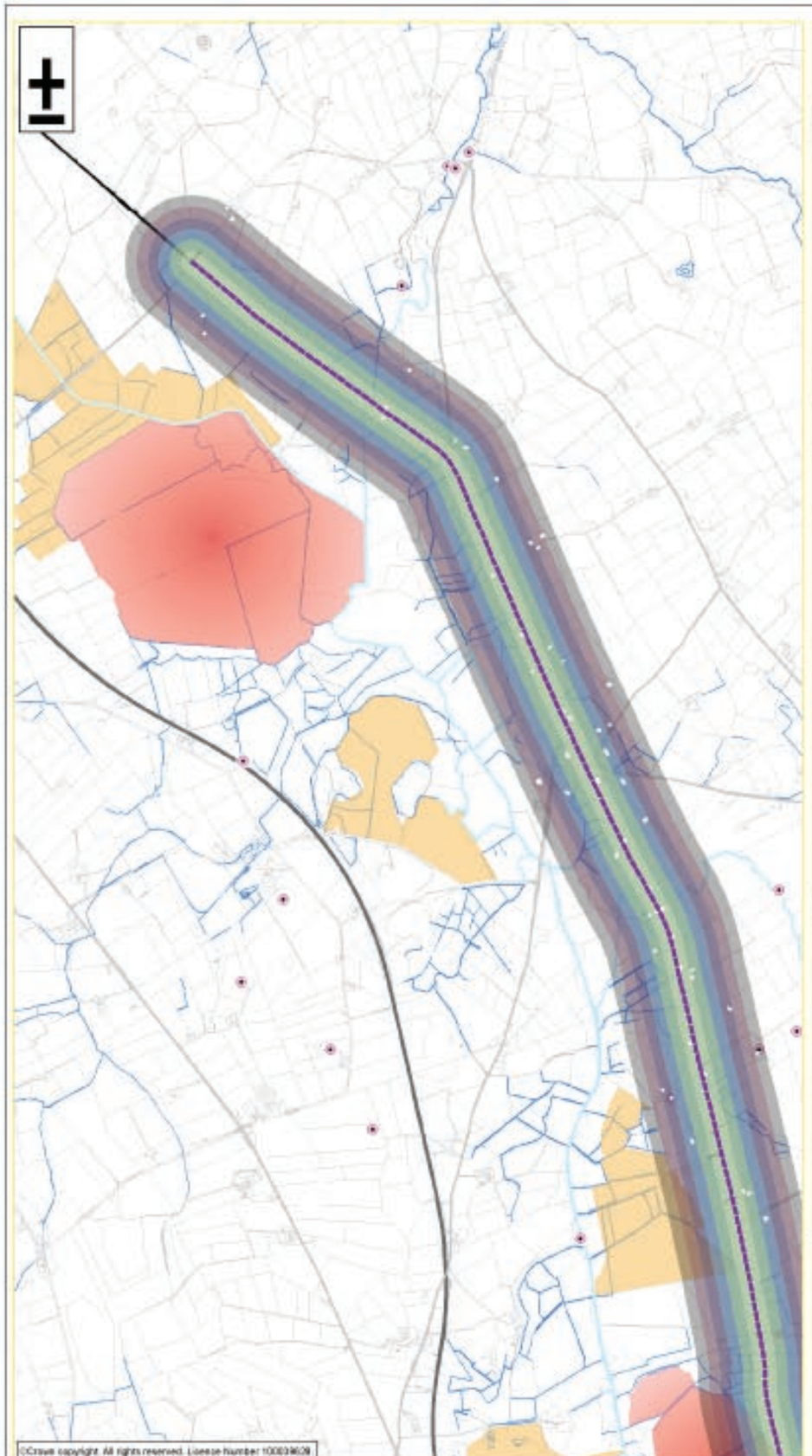
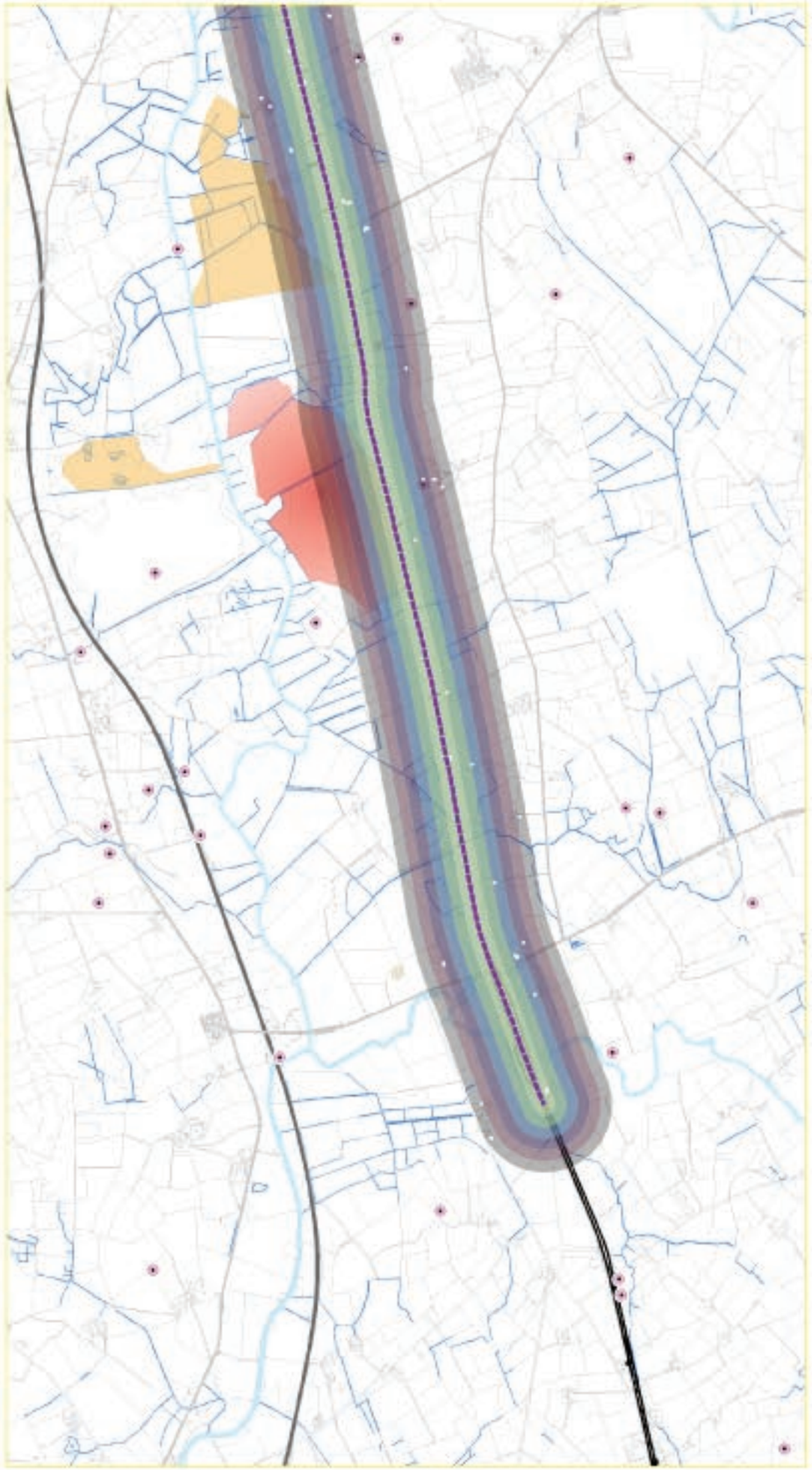
Job No.	Drawing No.	Issue
120429	**A26-ENV-010**	**P0**





LEGEND

- Residential Properties
- H Sites of Cultural Heritage Importance
- Main Valley Bogs SAC / ASSI
- Dundermot Motte
- Frosses Trees
- Sites of Local Nature Conservation Interest
- Existing A26 Traffic Route
- Local Road Network
- Belfast to Portrush Railway Line
- River Main & Tributaries
- On-line Route

Buffer	No. Properties
300m	68
250m	62
200m	55
150m	45
100m	33
50m	22

NOTES:

0 500 1,000 2,000
Metres
Scale Bar

Issue	Date	By	Chkd	Apprvd
P0	15/03/07	SA	AS	KC

Produced using Geographical Information Systems

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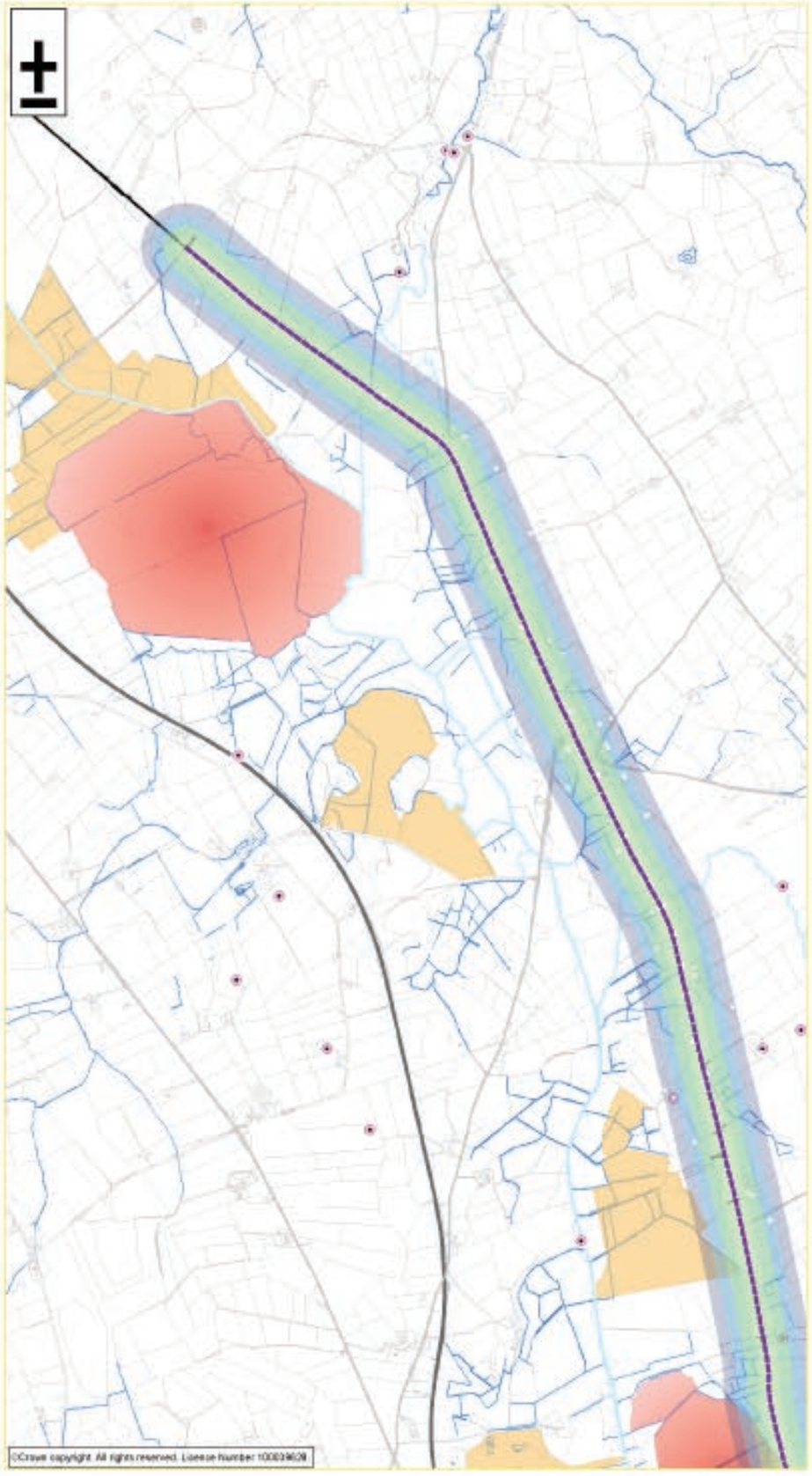
Client
Roads Service NI, Northern Division

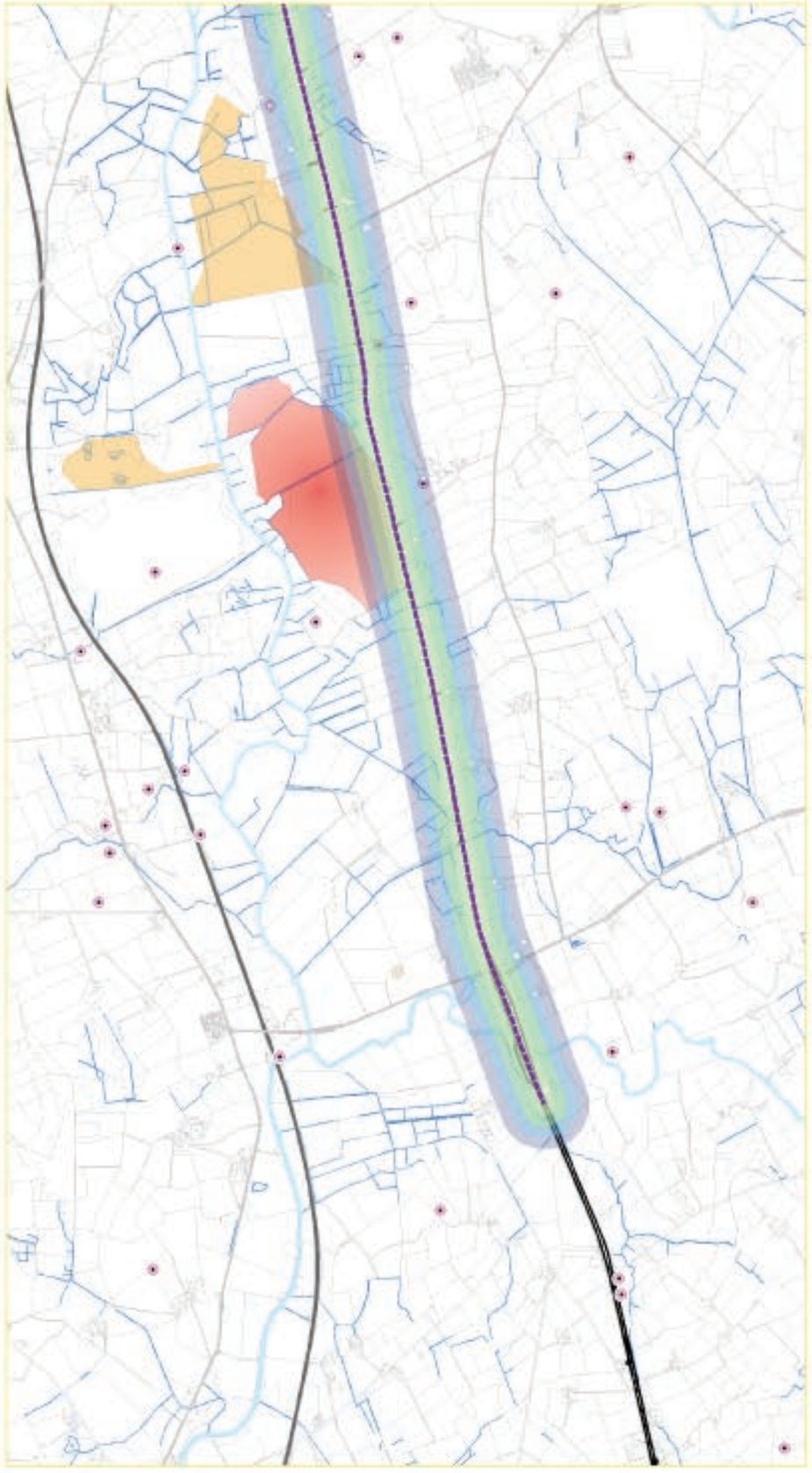
Job Title
A26 Dualling Glarryford To A44 Junction

Drawing Title
Noise Sensitive Receptors - Central Corridor

Plot ID J:\120429-004-40 Calculations-Data\GIS\ArcGIS\MapDocuments\Env Stage 1\A26-ENV-011

Scale at A3	Drawing Status	
1:25,000	**Preliminary**	
Job No.	Drawing No.	Issue
120429	**A26-ENV-011**	**D1**





LEGEND

- Residential Properties
- H Sites of Cultural Heritage Importance
- Main Valley Bogs SAC / ASSI
- Dundermot Motte
- Frosses Trees
- Sites of Local Nature Conservation Interest
- Existing A26 Traffic Route
- Local Road Network
- Belfast to Portrush Railway Line
- River Main & Tributaries
- On-line Route

Buffer	No. Properties
200m	55
150m	45
100m	33
50m	22

NOTES:

0 500 1,000 2,000
Metres
Scale Bar

Issue	Date	By	Chkd	Apprvd
P0	15/03/07	SA	AS	KC

Produced using Geographical Information Systems

ARUP
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www.arup.com

Client
Roads Service NI, Northern Division

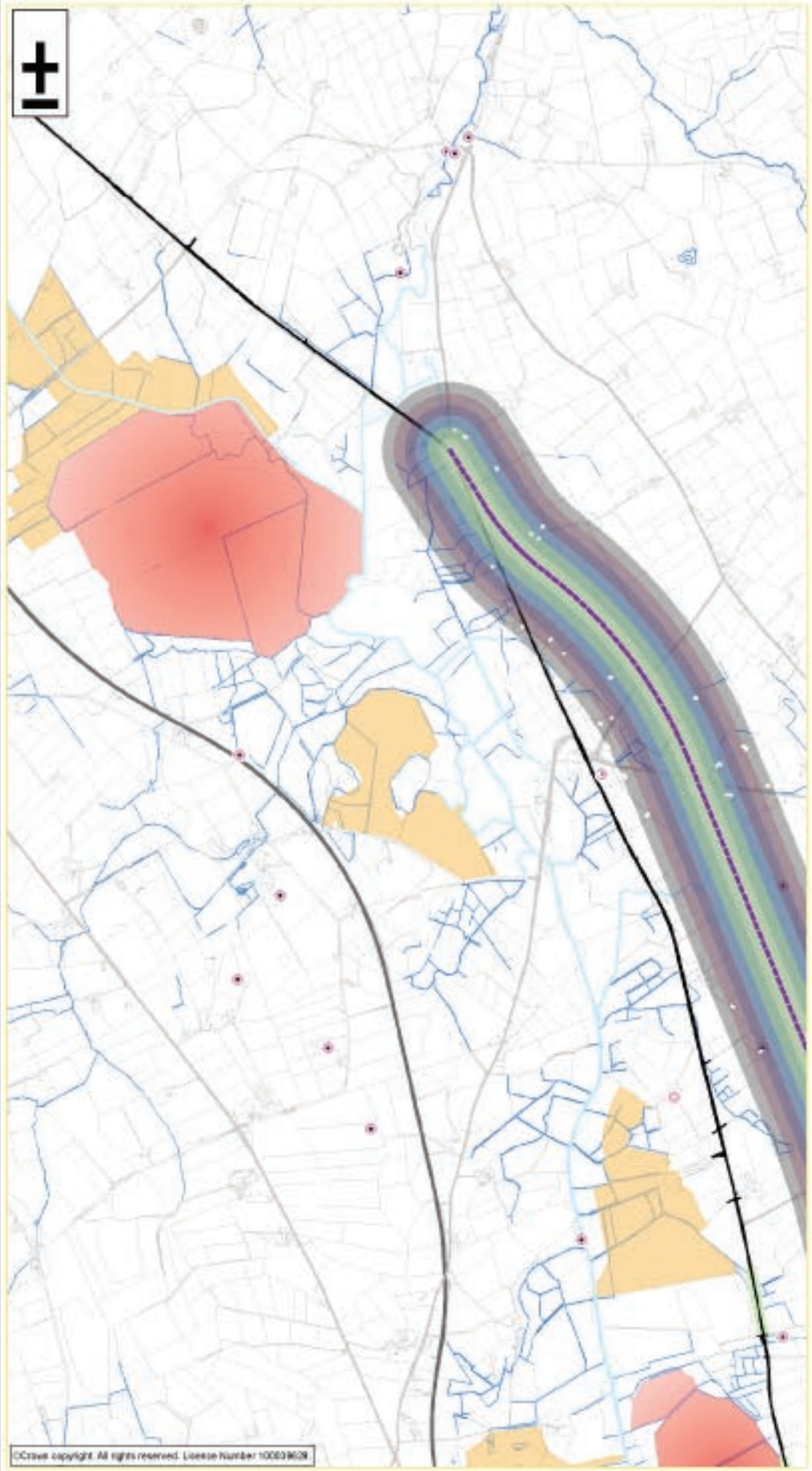
Job Title
A26 Dualling Glarryford To A44 Junction

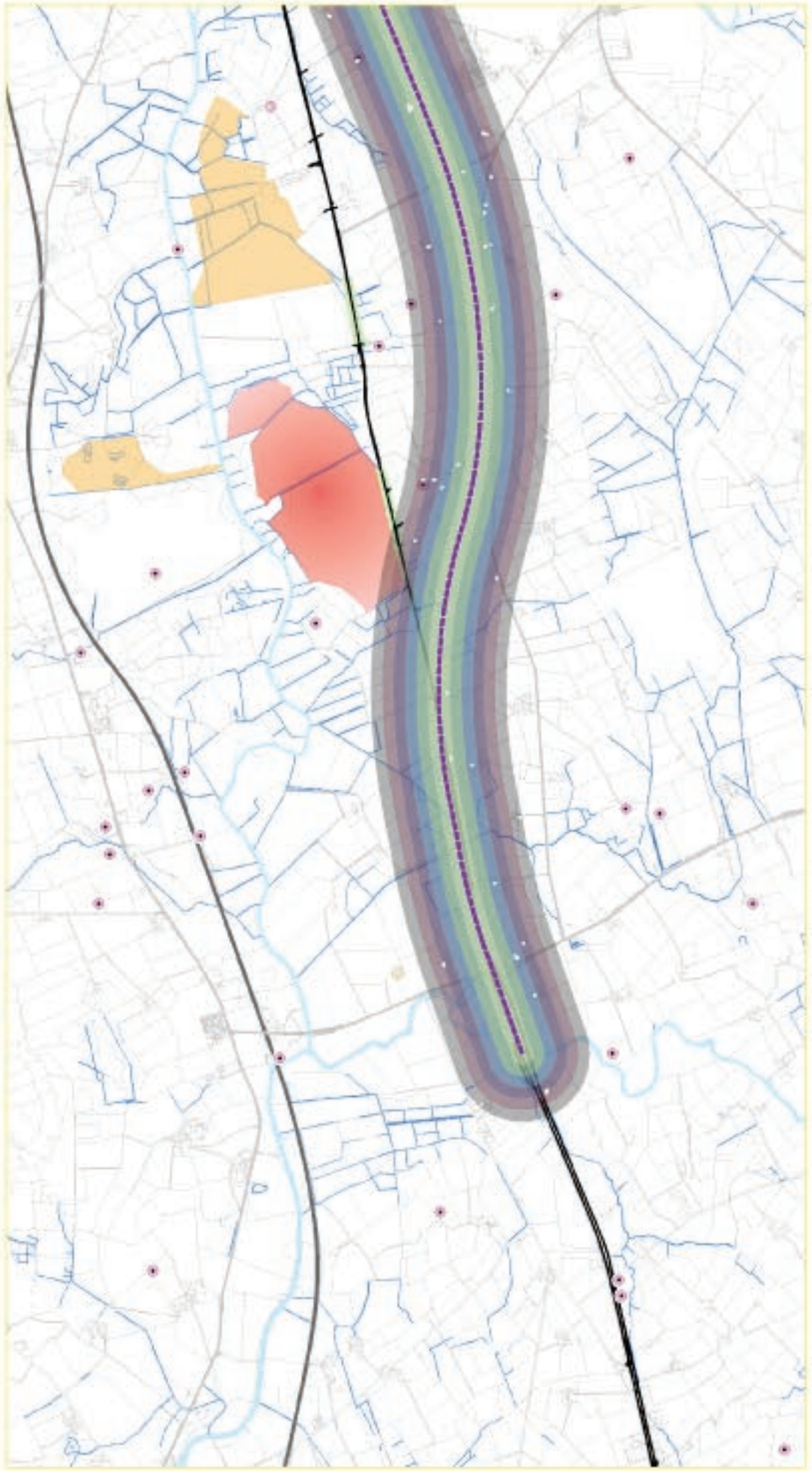
Drawing Title
Air Sensitive Receptors - Central Corridor

Plot ID J:\120429-00\4-40 Calculations-Data\GIS\ArcGIS\MapDocuments\Env Stage 1\A26-ENV-012

Scale at A3	Drawing Status
1:25,000	Preliminary

Job No.	Drawing No.	Issue
120429	A26-ENV-012	P0





LEGEND

- Residential Properties
- H Sites of Cultural Heritage Importance
- Main Valley Bogs SAC / ASSI
- Dundermot Motte
- Frosses Trees
- Sites of Local Nature Conservation Interest
- Existing A26 Traffic Route
- Local Road Network
- Belfast to Portrush Railway Line
- River Main & Tributaries
- Eastern Route Option

Buffer	No. Properties
300m	54
250m	46
200m	38
150m	27
100m	13
50m	3

NOTES:

0 500 1,000 2,000
Metres
Scale Bar

Issue	Date	By	Chkd	Apprvd
P0	15/03/07	SA	AS	KC

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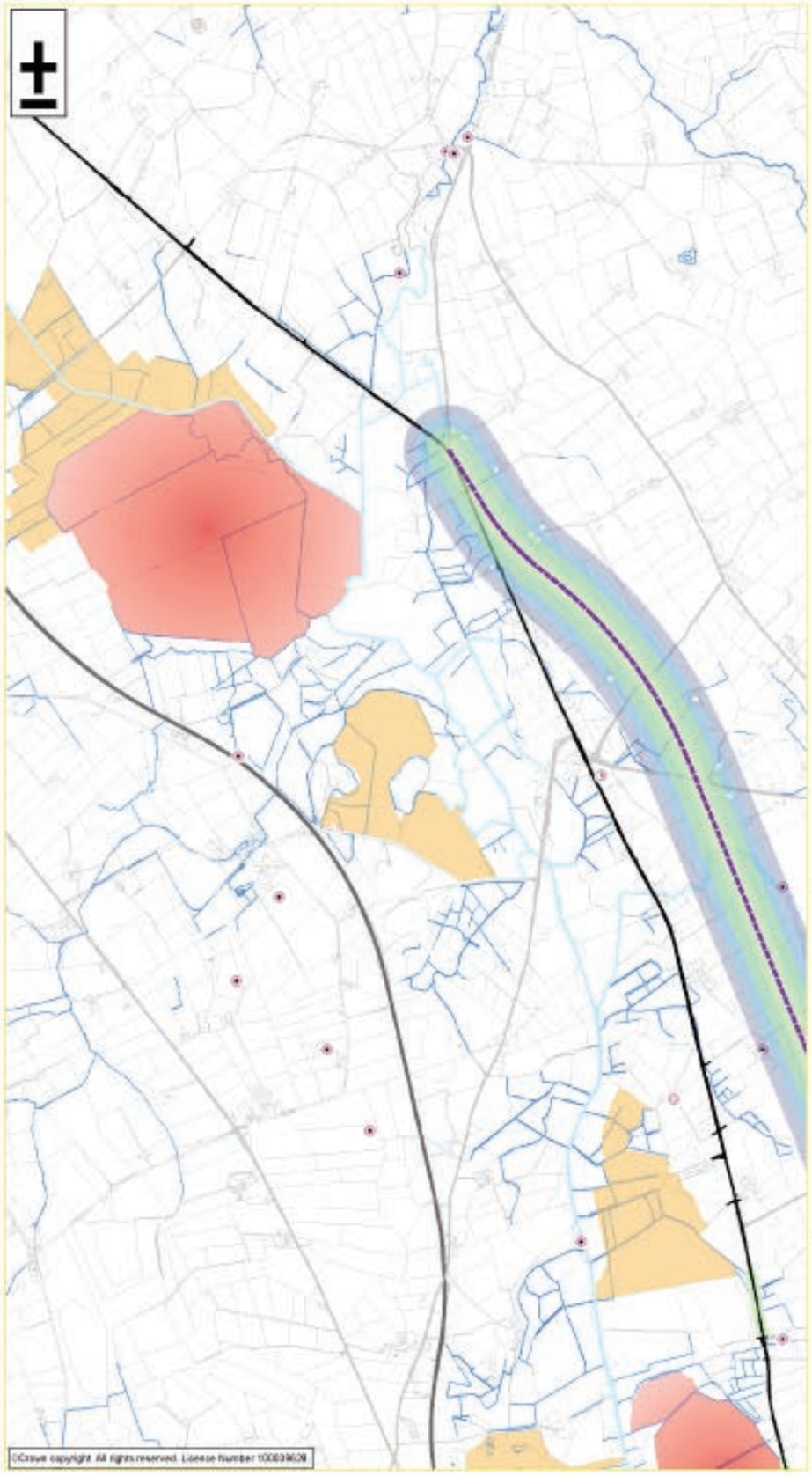
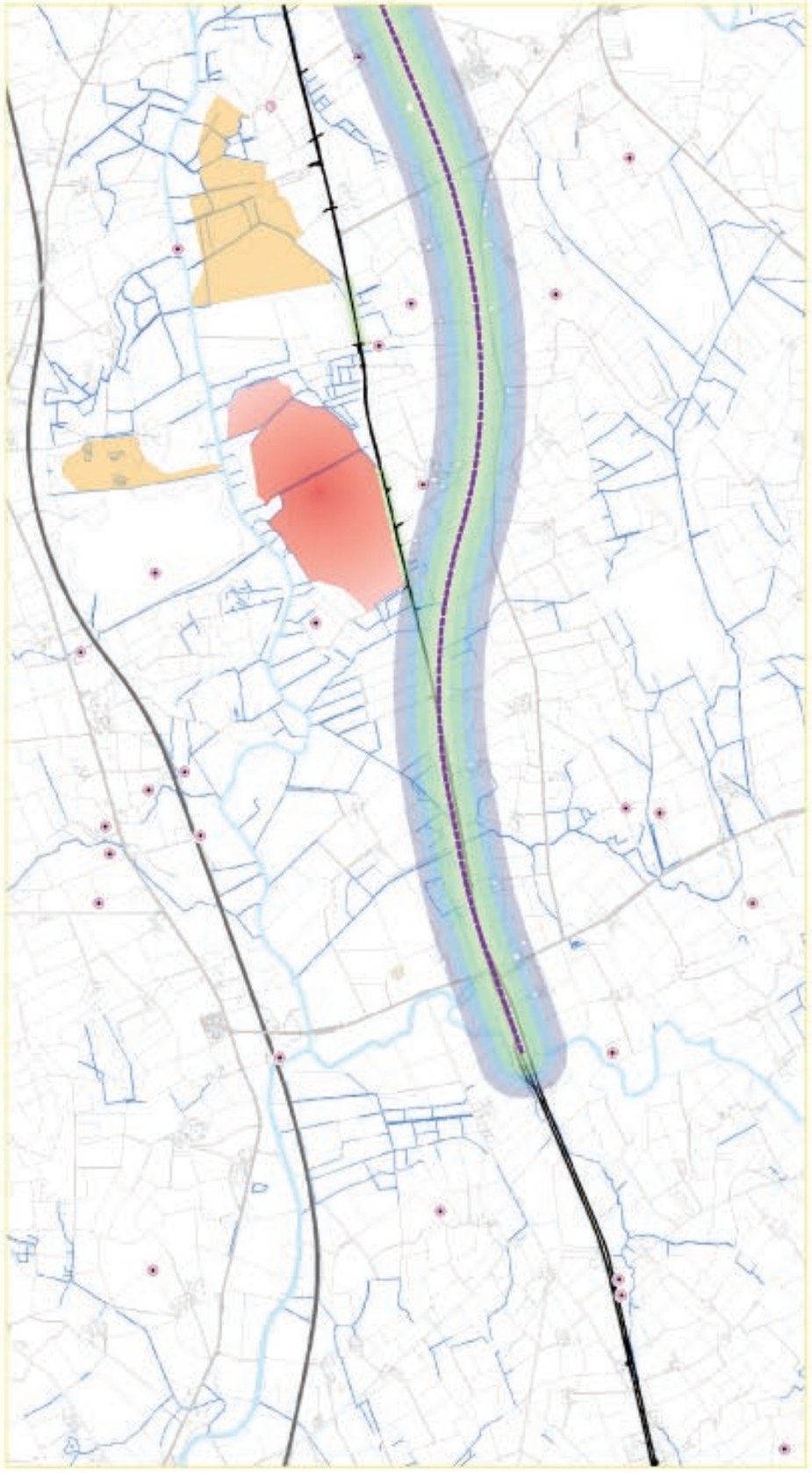
Job Title
A26 Dualling Glarryford To A44 Junction

Drawing Title
Noise Sensitive Receptors - Eastern Corridor 1

Plot ID J:\120429-004-A0 Calculations-Data\GIS\ArcGIS\MapDocuments\Env Stage 1\A26-ENV-013

Scale at A3	Drawing Status	
1:25,000	Preliminary	
Job No.	Drawing No.	Issue
120429	A26-ENV-013	P0





LEGEND

- Residential Properties
- H Sites of Cultural Heritage Importance
- Main Valley Bogs SAC / ASSI
- Dundermot Motte
- Frosses Trees
- Sites of Local Nature Conservation Interest
- Existing A26 Traffic Route
- Local Road Network
- Belfast to Portrush Railway Line
- River Main & Tributaries
- Eastern Route Option

Buffer	No. Properties
200m	38
150m	27
100m	13
50m	3

NOTES:

0 500 1,000 2,000
Metres
Scale Bar

Issue	Date	By	Chkd	Apprvd
P0	15/03/07	SA	AS	KC

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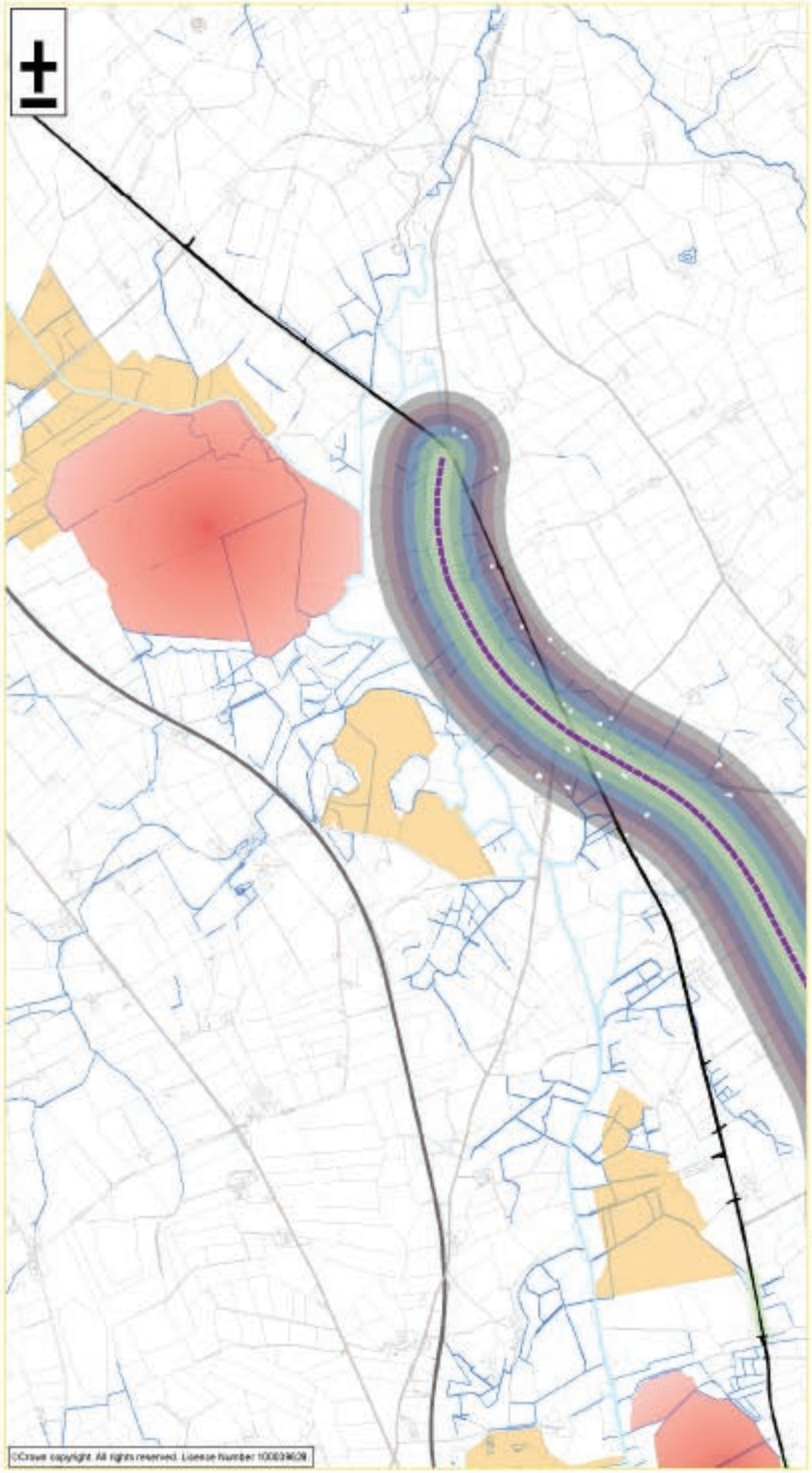
Job Title
A26 Dualling Glarryford To A44 Junction

Drawing Title
Air Sensitive Receptors - Eastern Corridor 1

Plot ID J:\120429-004-40 Calculations-Data\GIS\ArcGIS\MapDocuments\Env Stage 1\A26-ENV-014

Scale at A3	Drawing Status
1:25,000	Preliminary

Job No.	Drawing No.	Issue
120429	A26-ENV-014	P0



LEGEND

- Residential Properties
- H Sites of Cultural Heritage Importance
- Main Valley Bogs SAC / ASSI
- Dundermot Motte
- Frosses Trees
- Sites of Local Nature Conservation Interest
- Existing A26 Traffic Route
- Local Road Network
- Belfast to Portrush Railway Line
- River Main & Tributaries
- East to West Corridor

Buffer	No. Properties
300m	57
250m	49
200m	35
150m	29
100m	14
50m	5

NOTES:

0 495 990 1,980
Metres
Scale Bar

Issue	Date	By	Chkd	Apprvd
P0	15/03/07	SA	AS	KC

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Client
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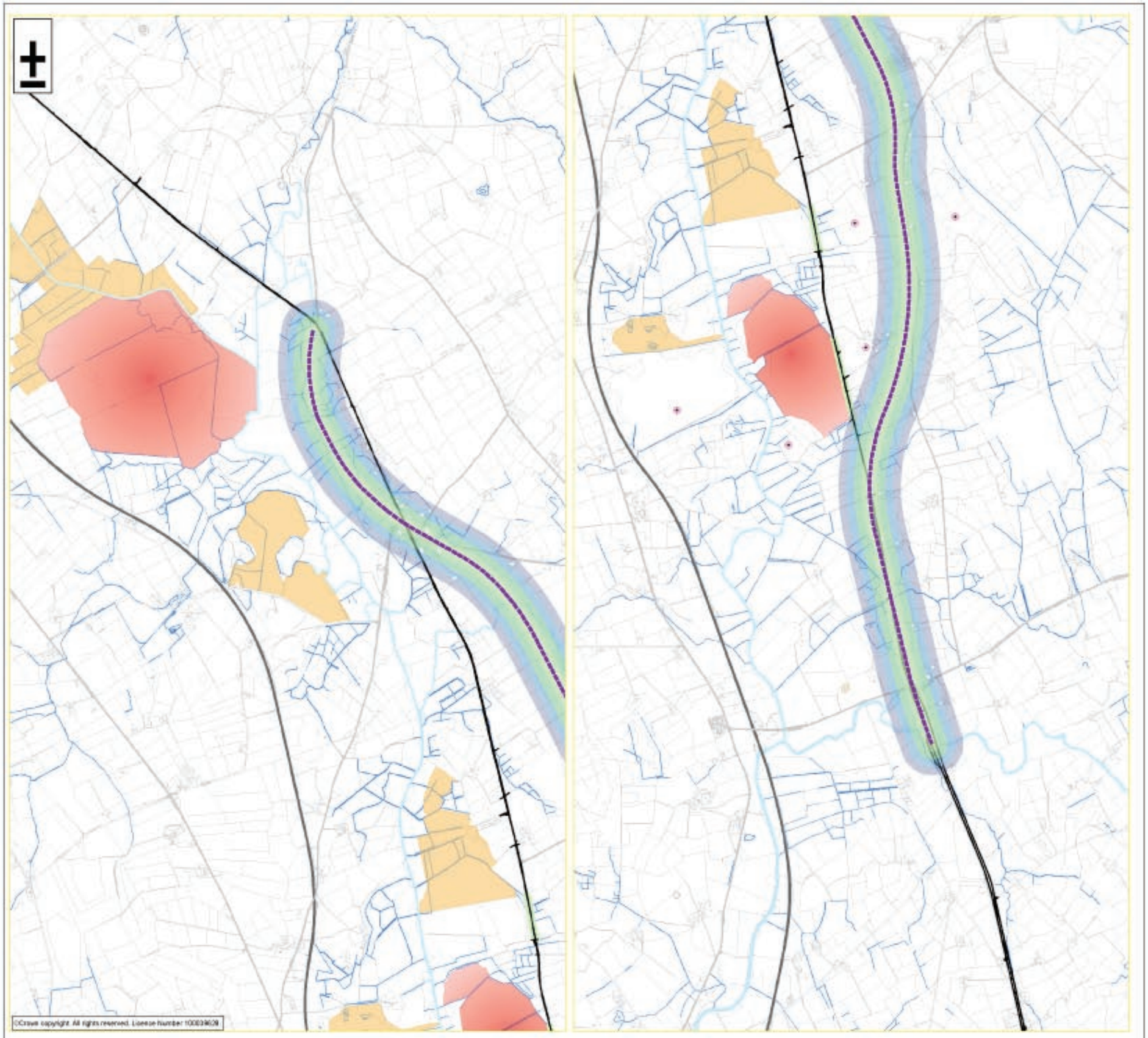
Job Title
A26 Dualling Glarryford To A44 Junction

Drawing Title
Noise Sensitive Receptors - East to West Corridor

Plot ID J:\120429-004-40\Calculations-Data\GIS\ArcGIS\MapDocuments\Env Stage 1\A26-ENV-015

Scale at A3	Drawing Status	
1:25,000	**Preliminary**	
Job No.	Drawing No.	Issue
120429	**A26-ENV-015**	**P0**



LEGEND

- Residential Properties
- H Sites of Cultural Heritage Importance
- Main Valley Bogs SAC / ASSI
- Dundermot Motte
- Frosses Trees
- Sites of Local Nature Conservation Interest
- Existing A26 Traffic Route
- Local Road Network
- Belfast to Portrush Railway Line
- River Main & Tributaries
- East to West Corridor

Buffer	No. Properties
200m	35
150m	29
100m	14
50m	5

NOTES:

0 500 1,000 2,000
Metres
Scale Bar

Issue	Date	By	Chkd	Apprvd
P0	15/03/07	SA	AS	KC

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Client
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Job Title
A26 Dualling Glarryford To A44 Junction

Drawing Title
Air Sensitive Receptors - East to West Corridor

Plot ID J:\120429-004-40\Calculations-Data\GIS\ArcGIS\MapDocuments\Env Stage 1\A26-ENV-016

Scale at A3	Drawing Status
1:25,000	**Preliminary**

Job No.	Drawing No.	Issue
120429	**A26-ENV-016**	**P0**