

NON-TECHNICAL SUMMARY

1. INTRODUCTION

National Grid Transco

Transco plc, which is part of National Grid Transco (NGT)¹, is one of the world's leading gas transportation companies and operates the majority of the onshore gas transportation pipeline system and storage infrastructure in Great Britain. The system, which is amongst the largest and most advanced gas supply systems in the world, consists of 280,000km of buried pipeline. In particular, NGT owns and operates the National Transmission System (NTS) and some of the Independent Distribution Networks (IDNs) in Great Britain.

The NTS is a network of high pressure pipelines that carry gas from coastal terminals to the main areas of demand within the UK. It comprises more than 6,700km of bulk transmission steel pipelines that currently operate at up to 85bar g. The NTS also includes associated facilities such as Liquid Natural Gas storage sites, compressor stations at intervals to boost the pressure of gas in the pipelines and Above Ground Installations (AGIs) for pipeline inspection and connections of supplies of gas to the IDNs. The IDNs take gas from the NTS and distribute it to consumers via discrete networks of pipelines.

Milford Haven to Aberdulais Pipeline

Transco has a statutory obligation, under the terms of its Gas Transporter's Licence, to lay a new natural gas pipeline to transport gas from two coastal terminals, being constructed by third parties, where it will be imported into the UK in liquid form (Liquid Natural Gas – LNG²), to connect to the existing NTS system.

One LNG terminal is located near Herbrandston to the west of Milford Haven in Pembrokeshire, South Wales and the second LNG terminal is located approximately 6.5km to the east, midway between Milford Haven and Neyland. The terminals will import LNG from ocean-going LNG tankers and store it in large tanks on the sites. Before the LNG is fed into the new gas pipeline it will be heated to vaporise it back into gaseous form.

The new pipeline will commence at the Herbrandston LNG terminal and then pick up natural gas from the second LNG terminal before continuing first northwards, then eastwards across South Wales to connect to the NTS adjacent to an existing AGI north of Aberdulais, north-east of Neath (OS Grid Ref. SN 783 009). The route of the pipeline is shown on Figure 1.

The new pipeline will be a 1220mm diameter, buried, steel pipeline approximately 120km long and it will have a maximum operating pressure not exceeding 94bar g.

The Milford Haven to Aberdulais pipeline will form part of the NTS once it is operational. It will be owned and operated by NGT.

¹ The term National Grid Transco (NGT) is used through-out this document to refer to either Transco or NGT, except where reference is made to the Gas Transporters Licence, which is held by Transco.

² Liquid Natural Gas is formed by cooling gas to form a liquid. The volume of LNG is 600 times the volume of the equivalent volume of natural gas in its gaseous form, allowing large volumes to be transported and stored in liquid form.

Associated Facilities

At the two LNG sites, new AGIs will be built to connect the pipeline to the terminals. At the Herbrandston LNG terminal the new AGI (called the Herbrandston AGI) will comprise a “pig trap”, which is a facility to launch and receive devices (called pipeline internal gauges or “pigs”) to inspect the new pipeline. The site will also accommodate associated pipework and valves, an instrument kiosk and communication equipment.

At the second LNG site, the new AGI (called the Newton Noyes AGI) will comprise a facility to introduce gas into the pipeline and associated pipework, valves, instrument kiosk and communication equipment.

Approximately half way along the pipeline route at Llangynog (OS Grid Ref. SN 332 153), a site will be constructed for a block valve.

At the end of the pipeline, near Aberdulais, a new AGI (called Derwen Fawr AGI) will be constructed close to the existing Aberdulais AGI. It will comprise a pig trap, plant to reduce the gas pressure prior to introduction into the NTS and associated plant enclosures, pipework, valves and communication equipment.

The associated facilities are covered by separate planning legislation and therefore do not fall under the consent required for the Environmental Statement (ES) for the pipeline. However, preliminary information on the associated facilities is given in an appendix to the ES.

Project Management

NGT is the project manager for the design and construction of the pipeline. The contract for the design, including Environmental Impact Assessment (EIA), and construction of the pipeline was let to the NACAP Lawrence Joint Venture in June 2004. The EIA has been prepared by RSK ENSR Environment Ltd, on behalf of NACAP Lawrence.

Programme

Pipeline construction is planned to commence in spring 2006. It is likely that preparatory works will commence before this time, including pre-construction surveys and removal of short sections of hedgerow for pipeline construction access. The main pipeline construction activities will be undertaken during the summer months of 2006 and 2007 to take advantage of better weather and light conditions. Certain activities such as the completion of road, rail and some main river crossings may continue into the winter of 2006/2007, subject to the approval of the Environment Agency (EA). All construction works are planned to be completed by the end of 2007.

2. PROJECT JUSTIFICATION

Transco has a statutory obligation as a Licensed Gas Transporter to develop and maintain an efficient and economical pipeline system for conveying natural gas. Transco also has a requirement to maintain the gas security standard and to supply the peak daily demand for gas. In particular, Gas Transporters are obliged to facilitate the development of the gas network to meet both domestic and industrial consumers' needs. If there is a predicted imbalance or shortfall in the system, Transco is required to take action to enhance the system to ensure an imbalance does not actually occur.

The requirement for the importation of LNG is driven by a predicted shortfall in future supplies of natural gas to the UK market from existing sources. The requirement for

the pipeline is driven by the fact that the new terminals need to be connected into the NTS. The new supplies are required to meet future gas demand in the United Kingdom.

3. LEGISLATIVE FRAMEWORK

Pipeline

Transco has Permitted Development rights, under which planning consent is granted automatically, to lay gas pipelines under Part 17 of Schedule 2 of the *Town and Country Planning (General Permitted Development) Order, 1995*. However, the proposed pipeline is subject to the *Public Gas Transporter Pipe-line Works (Environmental Impact Assessment) Regulations, 1999* (hereafter referred to as the *PGT Regulations*). As the proposed pipeline will be over 40km in length and will have a diameter of over 800mm, it falls under Part 1 of Schedule 3 of the *PGT Regulations* which state that an Environmental Impact Assessment is required. This Environmental Statement (ES) meets the requirements of the *PGT Regulations* and is submitted for approval to the Secretary of State for Trade and Industry.

A number of other consents are also required for the construction and operation of the pipeline, such as those required for crossing watercourses and those relating to the protection of plants and animals. These will be applied for, as required.

Associated Facilities

The connection works at the three AGIs and the block valve fall outside the scope of the *PGT Regulations*. Planning consent for the AGIs at the LNG terminals has been granted as part of the planning consent for the terminals, which have been subject to separate Environmental Impact Assessment. Applications for planning consent will be submitted by NACAP Lawrence for the Block Valve at Llangynog and the Derwen Fawr AGI.

4. ROUTE SELECTION, DESCRIPTION AND JUSTIFICATION

General

Consideration of alternative routes is an important part of the EIA process as it is one of the key mitigating measures for linear developments such as pipelines. In response to this, NGT has a systematic route selection process for pipelines, consisting of four stages:

- identification of an Area of Search, which aims to cover all possible routes between the potential start and end points of a pipeline;
- identification of potential Route Corridors (1km wide bands) within the Area of Search;
- selection of a preferred Route Corridor and identification of a Preliminary Pipeline Route (PPR) within that corridor; and
- identification of the final route during the conceptual and detail design stages of the project.

In parallel with the route selection process, the location of the AGIs is also progressed, in accordance with guidelines on the selection of AGIs set down by NGT.

Milford Haven to Aberdulais

Following identification of the need for a new gas pipeline, should LNG be imported via the Milford Haven area, NGT commissioned a Route Corridor Investigation Study (RCIS). The purpose of the RCIS was to identify potential pipeline Route Corridors between the possible importation points and the existing NTS pipeline system in the area of Aberdulais, north-east of Neath, from where the gas can be transported via the NTS to the main centres of demand.

Due to the scale of the proposal, two RCISs were commissioned, one for the west of the area and one for the east. However, the studies were completed and reported in parallel, with the overall conclusions reported in the eastern study.

The Area of Search for the section of the pipeline from Milford Haven to the Narberth area comprised an area of approximately 468km² over the counties of Pembrokeshire and Carmarthenshire. The Area of Search for the Narberth to Aberdulais section of the pipeline comprised an area of 1074km² and included part of the counties of Pembrokeshire, Carmarthenshire, Swansea, and Neath Port Talbot.

Key publicly available environmental, archaeological, engineering and health and safety data was gathered and assessed for the Areas of Search and led to the identification and selection of an initial preferred Route Corridor for further development. Key constraints taken into account at this stage included, but were not restricted to:

- the crossing of the Western Cleddau, Eastern Cleddau, River Taf, River Towy and River Loughor, which are all part of Special Areas of Conservation (SACs) (sites designated at European level for their ecological value);
- the avoidance of Scheduled Ancient Monuments and Historic Parks and Gardens;
- the crossing of floodplains by the shortest route possible;
- the avoidance of the many Sites of Special Scientific Interest (SSSI), areas of Ancient Woodland and nature reserves in the area;
- the avoidance of identified waste disposal, landfill and mineral sites, as far as possible; and
- the crossing of the River Tawe valley at Pontardawe, which exhibits steep slopes, ribbon development of houses and roads and areas of contaminated land.

A vantage point survey, and more detailed consideration of options, was then undertaken in order to define the PPR. Some major changes were made at this stage in order to, for example, accommodate a connection to the west rather than the east of the second LNG terminal between Milford Haven and Neyland, avoid potential conflicts with possible road schemes and avoid areas presenting construction difficulties.

The PPR then formed the basis of a line-walk and ecological surveys of the entire pipeline length. In addition, desk-based assessments and surveys were undertaken of the geology, soils, mining, archaeology and landscape of the PPR and associated Route Corridor. As a result nearly eighty further changes were made. Of the re-routes:

- nineteen were made to shorten the pipeline, for example north-west of the village of Meinciau;
- thirteen were made to minimise hedge removal and avoid impacts on woodland as far as possible, for example south of Pan-gelli-uchaf Farm where the pipeline route

has been amended to pass to the south of a small section of woodland, and north of Freystrop, where the revised pipeline route means less hedges will be crossed and smaller sections of hedgerow will need to be removed;

- one was made to avoid a standing stone of archaeological importance at OS Grid Ref. SN 452 121, south of Pontantwn; and
- twelve were incorporated to cross overhead electricity transmission lines and existing gas pipelines in positions that minimise safety hazards.

Other re-routes were also made to facilitate crossings of tracks, rivers, avoid undue disruption to farms and avoid side slopes, which have safety implications.

At the conclusion of the above process a route was chosen on which a draft ES was based. The draft was then circulated for comment to consultees, including the Unitary Authorities, the EA and the Countryside Council for Wales (CCW). An additional eight re-routes were then made to the route, based on an internal review, consultee comments and further surveys.

The effect of these re-routes has been to further reduce ecological impacts. In particular, the pipeline route now crosses a much smaller area of both the common land at Tor Clawdd, north-west of Craig-cefn-parc (designated by Swansea County Council as a proposed Site of Interest for Nature Conservation) and an area of acid grassland and heathland at Mynydd Gellionnen, west of Pontardawe. In addition, the pipeline has been re-routed to minimise an area of raised peat bog at Fforest Goch, south-east of Pontardawe, and minimise the area of semi-natural broadleaved woodland and hedges crossed to the south of Robeston Wathen.

5. GAS PIPELINE CONSTRUCTION AND OPERATION

General

The methods and procedures used by NACAP Lawrence and National Grid Transco (NGT) to construct gas pipelines are well established and based on established NGT best practice, Institute of Gas Engineer's guidance, British and International Standards and Regulations, including the Institution of Gas Engineers' (IGE) *Recommendations on Transmission and Distribution Practice – IGE/TD/1: Edition 4, 2002 – Steel Pipelines for High Pressure Gas Transmission*.

The design and construction of the pipeline will incorporate the requirements of third parties and the mitigation measures outlined in this ES. During the design phase, NACAP Lawrence will produce Method Statements covering the construction of crossings for watercourses, roads, railways and any archaeologically or ecologically sensitive areas. Method Statements will be agreed with the appropriate consenting authorities. NACAP Lawrence will also develop, in consultation with NGT, a Project Environmental Management Plan, Waste and Water Management, Pollution Prevention and Emergency Response Plans detailing how the environmental impacts of construction activities and the risk of incidents will be minimised.

The methodology for the construction and operation of the pipeline is described in more detail below:

Pre-construction Works

Ahead of construction, the route will be surveyed and the precise line of the route marked. Where appropriate, pre-construction field drains will be installed within the

working width to maintain existing field drainage systems and reduce water flow into the pipeline trench during construction.

Preparation of the Working Width

All construction activities will normally be undertaken within a fenced strip of land, known as the working width, which will generally be 44m wide. A wider working width (nominally 66m) will be provided at road, rail, watercourse and service crossings to provide access, storage for excavated material from pits, space for equipment and off-road temporary parking space.

The working width will be prepared by fencing off the working width and removing vegetation and sections of hedgerow and field boundaries. The width removed will generally be approximately 22m but at non open-cut (trench-less) crossings of major roads, main rivers and railways, where access only is required for plant and machinery, this will be reduced to approximately 15m.

Rivers and streams will be generally be bridged or flumed (by the installation of temporary pipes) to provide an access track for plant and machinery during construction.

Topsoil Stripping

The topsoil will be stripped on a field-by-field basis across the working width by earth moving equipment and stored to one side. The topsoil stack will be typically 12m wide and will generally not exceed 3m in height. Gaps will be left in the topsoil stack in floodplains.

Temporary Access Roads

Temporary access roads between public roads and the working width will be required along the proposed pipeline route to aid the movement of machinery and materials, particularly where the ground is soft. They will typically be constructed by laying crushed stone over a geotextile membrane or timber rafts called 'bog mats'.

Pipe Delivery, Stringing and Bending

Pre-coated pipes will be delivered to a local sea port and then by road to temporary pipe storage areas (pipe dumps) located at strategic locations along the pipeline route. The pipe will be transported from the temporary storage areas along the working width and laid onto wooden skids adjacent to the trench line.

Welding, Testing and Coating

The pipeline sections will then be welded together. All the welds will be tested and certified before a coating is applied to protect the welds from corrosion.

Trench Excavation

The pipe trench will be dug either with mechanical excavators straddling or running alongside the pipeline trench or using a specialised trenching machine. The depth will be variable but will allow a minimum depth of 1.2m above the pipeline in agricultural land. The excavated material from the pipe trench will be stored on the opposite side of the working width from the topsoil to prevent mixing of subsoil and topsoil.

The results of site investigations may reveal areas that cannot be excavated using conventional equipment and where additional measures may be required. For example, controlled blasting may be necessary where very hard rock exists at shallow depth.

Pipe Lowering, Tie-in and Backfilling

Following trench excavation each welded pipe section will be lowered into the trench. The pipe trench will then be filled with the material taken from the trench in the reverse order to which it was excavated. The backfilled trench will then be consolidated by tamping or rolling.

Reinstatement

After re-grading of the working width to reflect the original profile, a replacement drainage scheme will be installed where necessary within the working width to ensure pre-existing drainage patterns are maintained. The working width will then be cleared, the subsoil loosened using agricultural machinery and stones and debris will be removed before the topsoil is replaced and cultivated.

All reinstatement measures will be discussed and agreed in advance with landowners and occupiers and statutory and non-statutory consultees before being incorporated into a Reinstatement Plan, which will include details of soil handling, the seed mixes to be used, plant sources and mixes and after-care regimes. Hedgerows will be replanted, and fences and hedgebanks re-built taking account of local styles and materials.

Road, Railway, River and Service Crossings

Typical methods of crossing roads, railways, watercourses and services can be divided into open-cut (where a trench is excavated) and non open-cut or trench-less techniques, where the pipe is installed by drilling or boring under the feature. Non open-cut techniques may, on occasion, require deep excavations on either side of the crossing. Both open-cut and non open-cut methods require additional land to be taken, temporarily, for storage of the extra excavated material and the necessary plant and equipment.

The adopted methods of construction will depend on the results of a borehole survey to determine ground conditions and on the requirements of the appropriate consenting authorities.

However, in broad terms, it is expected that open-cut and non open-cut techniques will generally be used as follows:

- major public roads will be crossed using a non open-cut crossing technique where practicable;
- private tracks and other roads will be crossed using open-cut techniques, subject to consultations with the landowners/occupiers and the appropriate statutory authorities;
- operational and disused railways will be generally crossed using non open-cut techniques;
- estuaries: non open-cut techniques;
- other main rivers: non open-cut techniques, except where this is not possible due to unsuitable ground conditions; and
- small watercourses will be crossed using dry open-cut techniques where the watercourse is either temporarily dammed and the water pumped round or the watercourse is temporarily culverted using flume pipes and the pipe trench is excavated underneath the pipes, subject to the agreement of the EA and other relevant consultees.

Testing and Commissioning

On completion of the construction of the pipeline, a hydrostatic test will be carried out. This involves filling the pipeline completely with water and raising the pressure, to ensure the integrity of the pipeline, before it is dried and filled with gas. The water will be abstracted and discharged back to rivers, with the approval of the EA and other consultees.

Site Establishment Areas and Pipe Dumps

It is likely that three temporary Site Establishment Areas (SEAs) will be required for temporary offices and storerooms, storage areas and workshops and that these will be located in the Templeton Airfield, Carmarthen and Pontardawe areas. In addition, temporary areas to store the lengths of pipe will be needed.

The location of the Site Establishment Areas and the temporary areas for pipe storage will be discussed and agreed with consultees. In addition to the above, temporary facilities for welfare and storage will be set-up at specific locations, such as the AGIs, for the duration of work in those areas.

The SEAs will either be sited on existing hard standing or stone over a geotextile membrane.

Operation

The use of a comprehensive corrosion protection system will ensure the integrity of the pipeline and will keep maintenance requirements to a minimum. The internal condition of the pipeline will be monitored periodically using automated internal inspections and the pipeline will be included in NGT's existing maintenance procedures. Above ground, the pipeline will be regularly inspected by helicopter and by walking the route; any disturbances to the ground will be reported immediately and investigated.

6. LAND USE AND PLANNING

Local Government in Wales is structured into Unitary Authorities, following local government re-organisation which abolished the old two-tier local authority system. The route crosses four Unitary Authorities: Pembrokeshire County Council, Carmarthenshire County Council, the City and County of Swansea and Neath Port Talbot Council. In addition, a small section of the route crosses the Pembrokeshire Coast National Park Authority area. These new authorities replace Dyfed and West Glamorgan County Councils, Pembrokeshire County Council, Carmarthen District Council, Dinefwr Borough Council, Lliw Valley Borough Council and the Borough of Neath.

The Structure and Local Plans produced by the County and District Councils before local government re-organisation still constitute the adopted planning guidance. These comprise two Structure Plans – Dyfed Structure Plan and West Glamorgan Structure Plan - and seven Local Plans providing detailed development planning guidance. However, the new Unitary Authorities have produced Unitary Development Plans (UDPs) to replace the Structure and Local Plans. None of the UDPs have been adopted; however, they can generally be taken to provide the most recent planning guidance. Relevant planning policies have been considered when drafting this ES and effort will be made to ensure compliance with these policies during construction and operation of the pipeline.

The proposed pipeline has been routed to avoid large residential areas, with the exception of Pontardawe, where the pipeline is unavoidably routed close to houses where it crosses the Swansea Road at the same place as an existing gas pipeline.

No significant existing or planned industrial areas or sites lie within the Route Corridor of the proposed pipeline, with the exception of the Milford Haven area.

The pipeline has been routed to avoid areas allocated for residential development in the UDPs. Details of planning applications and extant planning consents within the Route Corridor have also been obtained and will be fully taken into account during the routeing and design of the pipeline.

Landtake for construction of the proposed pipeline will be temporary and kept generally within the 44m wide working width. Once the pipe has been laid and the land reinstated, there will be no permanent loss of land along the pipeline route, with the exception of the areas required for the Above Ground Installations.

7. PHYSICAL ENVIRONMENT

Topography

The pipeline will have no impact on topography either directly or indirectly as reinstatement procedures will ensure that the working width is restored to pre-existing contours. Particular attention will be paid to removal of any wheel ruts or other depressions that could lead to gulying. The steep slopes encountered on parts of the route will increase the risk of pollution by sediment laden run-off during construction; impacts and mitigation measures for this are discussed further in Section 9. It will be necessary to ensure rapid establishment of vegetation in these areas to minimise the risk of subsequent erosion.

Geology

The route passes close to a geological Site of Special Scientific Interest. NACAP Lawrence will ensure that the working width is outside the site.

Part of the route passes through very strong 'massive' sandstones where excavation of the trench by conventional means may be difficult. Locally, blasting may be required and this has the potential to generate noise and dust, see Section 14 for further discussion of these issues.

The route passes through one large area of previous landslip in the Clydach Valley and may pass through another south-east of Pontardawe. The pipeline design will require modification for the former. For the latter, a ground investigation is underway to identify the precise location of the landslip in relation to the pipeline and a minor realignment of the pipeline route will be made, if necessary, to ensure that the landslip is avoided.

Mining

The pipeline has been routed to avoid any current or consented future mineral extraction but it does pass through areas of historic mining activity associated with the Pembrokeshire and South Wales coalfields. Detailed ground investigation surveys are underway to locate the positions of coal seam outcrops, investigate the stability of old adits, mine entries and shafts and establish whether old shallow mine workings, at risk of collapse if disturbed, are present. On the basis of the ground investigation findings,

a programme of stabilisation will be implemented to ensure that any potential impacts are addressed.

Ground Contamination

There are potentially contaminated soils in a number of locations, including sites of historic pollution incidents, disused petrol stations, landfill sites, mining and mineral extraction sites and past industrial sites. Further ground investigations will be targeted in these areas. Mitigation measures will be implemented to ensure that any existing contamination is identified and that it is not either spread locally within the site, or disposed of to potentially sensitive off-site locations. Any potentially contaminated material will be analysed and the EA's approval sought to whether the spoil is uncontaminated and can be re-spread in the area from which it was removed or if it is contaminated and will need treatment and/or disposal.

Investigations will also be undertaken to determine if barriers ('water stops') need to be inserted into the pipeline trench to minimise the risk of the trench acting as a pathway for groundwater or mine gases.

Soils

A small proportion of the pipeline route (about 1%) crosses areas of peat. There is the potential for pipeline construction to cause long-term settlement in these areas. A detailed Method Statement for pipeline construction and reinstatement of these areas will be produced.

Pipeline construction will be timed to minimise damage to soils. However, wet soils will be encountered over much of the pipeline route due to high rainfall levels or inherently wet soils. The requirement for timber bog mats and other methods to reduce compaction will be assessed on a field-by-field basis. Nevertheless, some compaction will inevitably be caused and this will be removed by sub-soiling and careful attention to the reinstatement of pre-existing drainage characteristics following reinstatement. Reinstated areas will be left to allow vegetation to re-grow, and drainage to be re-established, before being returned to grazing.

NACAP Lawrence and NGT will employ Agricultural Liaison Officers (ALOs) to control when soils can be worked and supervise the reinstatement process.

8. AGRICULTURE

The pipeline route passes through mainly agricultural land, the majority of which is used for cattle grazing and as grassland for silage production. The land in the extreme west of the pipeline route is also suitable for growing crops of early Pembrokeshire potato and some cereal production on a limited scale. The pipeline also passes through land managed under agri-environment schemes. This includes Tir Gofal, Environmentally Sensitive Areas, and Habitat Schemes. There are several farms registered under the Organic Farming Scheme.

There will inevitably be some temporary disruption to farming activities. This will be principally during the construction phase when there will be a temporary loss of use of agricultural land, possible disruption of services and the removal of sections of boundaries.

In order to minimise any disruption, mitigation measures, such as temporary drainage systems, access across the working width and additional stock watering points, will be

agreed with affected landowners and occupiers under formal Pre-Entry Agreements. Measures to prevent the spread of plant and animal diseases and agricultural weeds will also be taken during construction.

After construction, normal agricultural operations can be resumed. The working width, including field boundaries, will be fully reinstated after construction.

9. WATER RESOURCES

Surface Watercourses

The Route Corridor crosses twenty-one main rivers, including the Western Cleddau, Towy and Loughor estuaries as well as a number of minor watercourses. All the estuaries, including those designated as SACs, will be crossed using non open-cut techniques. Other main rivers will also be crossed using non open-cut techniques except where this is not possible due to unsuitable ground conditions.

Vehicle access across watercourses will be needed during construction (with the exception of those that cannot be bridged) and damage/sediment release will be minimised by constructing these crossings using flume pipes or bridges, see Section 5, above. Smaller watercourses will be constructed using dry open-cut techniques to minimise sediment release. Watercourse banks will be reinstated in accordance with EA requirements, using geotextile for any necessary reinforcement, as far as practicable.

Pre-construction cut-off drains will be installed to help reduce the flow of surface and groundwater into the pipe trench and other dewatering systems will also be considered in areas of high groundwater. Where water does need to be pumped out, it will, wherever possible, be discharged to land to allow settlement of suspended silt, rather than to watercourses and sediment filters will be used, as appropriate. All discharges will be agreed with the EA. A 'Permit to Pump' system will also be used whereby pumps and discharges are approved by a trained manager before pumping commences.

The steep slopes on the eastern half of the pipeline route, combined with high rainfall levels, could result in sediment running off the working width into rivers and streams. A pre-construction survey will be completed to identify those areas particularly at risk from sediment run-off. This information will be used to prepare a Water Management Plan for the pipeline. Where risks are identified, measures will be put in place, including building small banks, trenches containing straw or laying coir matting to trap or divert silt away from rivers.

Best practice pollution prevention and control measures will be used, as recommended by the EA to minimise the risk of pollution from spillages of fuels and cement. As part of their Project Environmental Management Plan, NACAP Lawrence will agree Pollution Prevention and Emergency Response Plans with the EA and Unitary Authorities.

The pipeline will be hydrostatically tested in several sections and will require the abstraction and discharge of large volumes of water. Where possible, water used in testing one section of pipe will be re-used for testing a subsequent section. Locations, and abstraction and discharge arrangements, will be agreed with the EA and the necessary consents obtained. No biocides or other chemicals will be added to the hydrostatic test water.

Water Abstractions

There are thirty-seven recorded surface water abstractions and twenty known points of groundwater abstraction within the Route Corridor, the majority of which are for agriculture. Strict pollution control measures will be used to ensure that these are not affected. For example, no machinery will be refuelled within 50m of a well or borehole or 30m of a river and banded bowsers will be used for refilling machinery, see Section 14 for more details. The pipeline is close to the Canaston public water supply (where water is abstracted from both the Eastern Cleddau and adjacent boreholes). Detailed Method Statements, for discussion with the EA and Welsh Water, will be produced to reduce any risks to the minimum.

Groundwater

Groundwater may already be contaminated in some areas where the pipeline route crosses or passes close to landfill sites, areas of restored former open cast mining, mine tips or backfilled quarries. Mitigation measures will include testing of groundwater, agreement of treatment/discharge/disposal arrangements with the EA and the installation of barriers in the trench to prevent groundwater travelling along the pipe trench.

The pipeline route crosses the edge of the protection zone for the Pendine water supply borehole, a major abstraction which lies some 5km to the south of the Route Corridor. Best practice pollution control arrangements will be implemented to ensure protection of the zone.

Pipeline construction has the potential to impact on groundwater flows, including springs, as the pipe trench can act as a pathway for groundwater flows. This will be minimised by careful attention to backfilling the pipeline trench, the installation of barriers in the trench and the design of land drainage schemes around the pipeline to ensure that pre-existing patterns are maintained.

A comprehensive programme of monitoring will be carried to check that there are no impacts on spring fed water supplies, wells and groundwater abstractions. The programme and methodology will be discussed in advance with the EA.

Floodplains

Twenty floodplains are crossed by the Route Corridor. Additional measures will be agreed, as necessary with the EA, to include, for example, leaving gaps for floodwater in the topsoil stack.

10. ECOLOGY

A comprehensive desktop study has been carried out with information collated from a wide range of statutory and non-statutory bodies relating to nature conservation issues within the 1km Route Corridor. An extended Phase 1 habitats and protected species survey has also been undertaken for a 140m corridor centred on the proposed pipeline route. In addition, a range of detailed surveys has been carried out (informed by a combination of the Phase 1 survey and desk study results).

Watercourses, including Aquatic Invertebrates (including White-clawed Crayfish), Fish, Water Voles and Otters

The pipeline will cross six rivers that have been notified as Sites of Special Scientific Interest (SSSI) for their fish, wildfowl, and/or otter populations, as well as for a range

of associated aquatic habitats. All or part of these rivers are also components of Special Areas of Conservation (SAC). In total, twenty-one main rivers will be crossed by the pipeline. All these rivers support diverse aquatic invertebrate faunas indicative of relatively high water quality.

In order to avoid impacts on protected habitats and species all the estuaries will be crossed using non open-cut techniques. Other main rivers will also be crossed using non open-cut techniques except where this is not possible due to unsuitable ground conditions. Detailed Method Statements for crossing all the main rivers will also be developed for approval by the Countryside Council for Wales (CCW) and the Environment Agency (EA).

The pipeline will also cross a relatively large number of smaller watercourses, mostly spring-fed small streams associated with field boundaries. The majority of these were of limited nature conservation value. These smaller watercourses and ditches will be crossed using dry open-cut techniques. The crossing points will be chosen to minimise impacts and preserve valuable features as far as possible. Bank and bed materials removed for construction will be stored separately and replaced from where they were removed, to promote re-establishment of the original habitats. Trees and shrubs removed will be replanted and the reinstated banks fenced off, where necessary, to prevent poaching. Geotextile matting will be used instead of gabions, wherever possible, to reinforce banks during reinstatement.

Various measures to protect water quality from sediment release, sediment run-off and pollution by fuel and oil, etc during construction are detailed in Sections 9 and 14, and these will also help to minimise the potential impacts on fish populations, aquatic invertebrates and otters. Wherever possible, works will not take place close to any otter lying-up/resting site. Where this is unavoidable, measures will be taken to minimise impacts on any resident otters, through careful timing of the works.

Neither white-clawed crayfish nor water voles were recorded on any of the watercourses.

Woodland and Trees

The pipeline has been routed to avoid all woodland designated as SSSIs. It has also been routed to avoid other woodland, as far as possible. However, the route will pass through twelve woodlands of high ecological importance. The impact on these woodlands, tree-lines and individual mature trees has been minimised by routeing, wherever possible, through gaps, rides and areas of lower nature conservation value.

Site-specific mitigation packages will be produced and agreed with CCW, Local (Unitary) Authority Ecologist and Biodiversity Officers where the pipeline crosses woodlands of nature conservation importance. These are likely to include a combination of measures such as localised route modifications to avoid specific features, reduction in the working width, sensitive soil removal and reinstatement to facilitate the re-establishment of the pre-existing ground flora and translocation of individual shrubs of particular value. The bands of woodland removed will be replanted, using site specific mixes of native species of local provenance, where available. Large tree species (such as oak, beech or ash) are not, however, planted within 6m of pipelines to avoid damage of the pipe by tree roots; a range of shrub and understorey species are used for planting close to and over pipelines.

Hedgerows

A large proportion of the hedges assessed during the walkover surveys were found to be 'important' (in the context of the Hedgerow Regulations 1997) and/or species-rich. Approximately 636 hedges will be crossed by the pipeline route, including 198 'important' hedgerows³. Many of these hedgerows are also likely to be of importance for protected species, particularly (in specific areas) for dormice and horseshoe bats.

The pipeline will be routed to avoid mature trees as far as possible and existing gaps and less species-rich sections will be crossed in preference, thereby minimising the impact. All hedgerows will be replanted with a mixture of native species that reflects the species removed. In areas where dormice and bats are known to use the hedgerows, additional measures (such as translocation of sections of hedge, accelerating the reinstatement of hedgerow sections removed and linking canopies overnight to maintain bat fly-ways) will be assessed.

Grassland, Heathland, Bog and Swamp

The majority of the route will pass through improved grassland (approximately 63km) and arable/silage 'production' land (approximately 27km) of low nature conservation importance.

The pipeline route will cross approximately 4.5km of marshy grassland, 19 fields of which are classified as Purple Moor-grass and Rush Pasture, a widespread UKBAP Priority Habitat. In addition, two areas of Lowland Heathland, one area of Heathland/Acid Grassland, an area of Coastal Saltmarsh, one area of Coastal and Floodplain Grazing Marsh, one Lowland Raised Bog, one Modified Bog and two areas of Swamp were recorded.

However, impacts on the coastal saltmarsh will be negligible, as the area will be included in the non open-cut crossing of the River Towy, and the pipeline has been routed to avoid the majority of the area of raised peat bog, as well as a number of other grasslands of nature conservation importance (in particular, areas of Purple Moor-grass and Rush Pasture). Impacts on two other areas of Purple Moor-grass and Rush Pasture will also be minimal as they will be part of non open-cut crossings of a river and railway, respectively.

In areas of species-rich grassland or heathland crossed by the pipeline, reinstatement measures will be developed to ensure the re-establishment of a species-rich sward, similar in composition to the original grassland or heathland plant communities. Sensitive soil stripping and handling, in which the upper turf and seed bearing layer is removed, stored and replaced separately to the rest of the topsoil, along with localised seed-harvesting techniques, will be considered. These techniques have been used to achieve successful reinstatement on a previous project in Wales. Detailed methodologies for these operations will be developed in consultation with CCW, Local (Unitary) Authority Ecologists and Biodiversity Officers.

When crossing marshy grasslands, bogs and swamps, measures will be taken to minimise any changes to the hydrological regime of these sites through careful attention to the design of any replacement drainage schemes and by inserting barriers ('water stops') in the pipe trench, where necessary to maintain wet areas. In addition,

³ An Important hedgerow is one defined, in accordance with the *Hedgerow Regulations, 1997*, as of particular historical or ecological value.

site specific Method Statements will also be agreed with CCW, Local (Unitary) Authority Ecologists and Biodiversity Officers for the two areas of peat crossed.

Terrestrial Invertebrates

Several features were highlighted during the Phase I surveys that appeared likely to support valuable populations and/or assemblages of invertebrates. In particular, several groups and lines of veteran trees, small blocks of woodland which comprised semi-natural habitat, and less frequently trimmed species-rich hedgerows, appeared likely to support valuable invertebrate faunas. The areas of marshy grassland and the less intensively grazed, more species-rich grass fields are also likely to support diverse and abundant invertebrate populations. The measures outlined elsewhere to reduce impacts on these features will also reduce impacts on invertebrates.

No marsh fritillaries were found to be present during the surveys, although a number of sites were considered to be potentially suitable for the species. Prior to works commencing in these areas, further surveys will be undertaken to confirm the continued absence of marsh fritillaries. If any are found, a mitigation strategy will be developed in consultation with CCW.

Great Crested Newts

Ponds with suitable habitat for great crested newts within 250m of the pipeline route will be surveyed for great crested newts in spring 2005, and mitigation measures developed in consultation with CCW, as necessary.

Reptiles

Three out of the four reptile species that occur in this part of the UK were observed during the Phase I surveys: common lizard, adder and grass snake. Although it is considered likely that common reptile species will be distributed throughout the pipeline route, few habitats of particular value for reptiles were identified.

The main period of pipeline construction activities (April to October) will avoid the reptile hibernation period, and thus there will generally be the opportunity for animals to escape from the working areas. Where features have been identified during the initial surveys as being particularly likely to support reptiles, these features will be cleared under supervision. .

Birds

During the Phase I surveys, suitable habitat for nesting and over-wintering birds was identified in a large number of locations. Wherever possible, impacts on nesting birds will be reduced by removing vegetation that could be used by them (particularly sections of hedgerow, scrub, tree lines and woodland) before the bird nesting season. Where this is not possible, the use of mechanical devices such as visual scarers and 'humming tape' will be considered in high risk locations, including locations where there is a high risk of ground nesting birds, in order to reduce the likelihood of birds establishing nests within or close to the working width.

The non open-cut crossings of the estuaries that are used by waders and wildfowl will be programmed, where possible, outside the season for over-wintering birds. Furthermore, the start and finish points of the crossings will be set back from the banks of the rivers.

Bats

Two confirmed tree roosts and a large number of mature trees and groups of trees that could provide suitable roost sites for bats were identified by the preliminary ecological survey. However, the pipeline will be routed to avoid the majority of these features. If it is unavoidable that any of these trees have to be felled, the trees will be inspected by a licensed, experienced ecologist for signs of use by bats. Should the presence of a roost be identified, felling will take place under licence from the Welsh Assembly, in consultation with CCW.

In addition, throughout the Route Corridor, the pipeline will cross features likely to be used by commuting and foraging bats, in particular, stream and river corridors, tree lines, and well-developed hedgerows. Given the potential importance of the hedgerow network in parts of the route, particularly in the vicinity of the Pembrokeshire Bat Sites SAC, measures will be developed to maintain links between canopies overnight in order to maintain fly-ways. The hedges will be replanted immediately following construction and surrounded by fencing, which will also have the effect of maintaining fly-ways. Consideration will also be given to methods of accelerating the re-establishment of hedges that are important commuting routes.

Several other habitats, notably the woodlands, wetland features, species-rich wet grasslands and cattle-grazed pasture, are likely to attract foraging bats, potentially including horseshoe bats: there will be temporary impacts from vegetation removal of these habitats, but reinstatement measures for these habitats will be implemented as described elsewhere.

Brown Hares

Suitable habitat for brown hares was identified at intervals throughout the walkover survey corridor. Individual hares were observed on a number of occasions, and it is likely that this species is widespread throughout the pipeline route. The impact on brown hares will be minimal, as the loss of suitable land will be temporary and small compared to the area of suitable land unaffected by the route.

Dormice

A dormouse survey has indicated that they can be assumed to be present in suitable habitat (including woodland, scrub, and hedgerows) throughout the Route Corridor between the River Towy and the River Loughor.

Wherever possible, all habitat features between these two rivers that could be suitable for use by dormice will be cut back/coppiced with care and minimal ground disturbance during the winter preceding the works. Removal of the stumps will be delayed until spring.

Additional mitigation measures will be designed on a case-by-case basis, depending upon the precise extent of the likely impacts on dormice in each location. These could include, for example, the management of the habitat each side of the hedge section or strip of woodland removed, to increase the value of the habitat for dormice, and providing artificial nest boxes.

Badgers

A large number of badger setts were recorded within or close to the walkover survey corridor during the Phase I surveys. Signs of badger activity were also identified and, in places, they appeared to be present at extremely high densities. Wherever

practicable, the pipeline route will be altered to avoid badger setts, so that works will not have to take place within 30m of any occupied setts. Where impacts on setts are unavoidable, measures will be taken to minimise impacts on any resident badgers, and all relevant operations will proceed under licence to CCW.

Further Investigations

Further surveys will be carried out, as required, to develop detailed construction methodologies and provide a baseline for monitoring reinstatement. A pre-construction survey for protected species, in particular to identify any new badger setts or otter lying-up sites established since the surveys for the ES were undertaken, will also be carried out.

After-care and Monitoring

NGT are committed to after-care and monitoring of sensitive habitats as would be reasonably expected of a developer and in accordance with their stated Environment Policy.

11. ARCHAEOLOGY AND HERITAGE

A database of known archaeological and heritage sites was compiled for the Route Corridor, recording a total of 859 sites. Of the total sites, 0.1% were of Palaeolithic or Mesolithic date, 10% of Neolithic or Bronze Age date, 1.2% of Iron Age date, 1.3% of Roman date, 16.2% of early Medieval or Medieval date, and 63.3% of Post-Medieval or Modern date. A further 6.6% were of uncertain date. The pipeline route passes through two Landscapes of Outstanding Historic Interest in Wales.

The proposed pipeline has been routed to avoid all statutory protected sites.

The potential impact of the proposed pipeline on non-statutory protected sites has been assessed on a site-by-site basis. Of the 859 sites identified, 788 are considered to be too far from the proposed route to be affected significantly. A site-specific programme of evaluation and investigation will be implemented for targeted areas including known sites where a direct impact has been identified. Sites where a direct impact is currently predicted will be preserved in situ or, if not desirable and feasible, by record.

There is also a strong chance that previously unknown archaeological features exist on the pipeline route. A programme of archaeological survey using geophysics and trial trenching is proposed prior to construction to help identify such sites. An archaeological watching brief during topsoil stripping will also be used to identify and record any previously undiscovered archaeology, record features of low archaeological importance or sites where the significance of impact is negligible.

It is anticipated that after the programme of mitigation has been implemented, there will be no residual impact on the vast majority of the known archaeological and cultural heritage features affected by the pipeline.

12. LANDSCAPE AND VISUAL IMPACT

The landscape of the proposed pipeline route varies widely in terms of quality, value and character. Certain sections of the proposed route have been designated for special protection, by the Unitary Authorities, due to their inherent landscape qualities or characteristics.

There will be some temporary disruption to specific landscape elements such as the grassland habitats, numerous hedgerows and hedgerows, trees and watercourses, which combine to form distinct landscape characters. This will be principally during the construction phase, as the working width will be fully reinstated after construction. After construction, the degree and duration of any residual landscape or visual impact will be determined by the nature of the landscape crossed. For example, arable land, permanent or temporary grasslands, hedgerows and woodlands respectively take an increasing length of time to reinstate.

It is considered that the construction and operation of the proposed pipeline will not give rise to any significant long-term impacts, or detract from the quality or character of any of the areas designated for special protection as a full programme of replanting and re-construction of hedges, fences and hedgerows will be carried out.

13. TRAFFIC AND TRANSPORTATION

The construction of a major gas pipeline will result in a temporary increase in traffic flow with potential impacts on other road users and community facilities.

The greatest transportation requirement during construction is the delivery of the steel pipe sections to the working width. Pipes will be transported by sea to local sea ports and then taken by heavy goods vehicles (HGVs) to pipe storage areas, the location of which will be finalised in consultation with the Highways Authorities. The routes to be used, and any measures such as speed restrictions and escort requirements, will be agreed with the local Highways Authorities to minimise disruption.

In addition, there will be HGV movements to deliver pipe, plant and materials to the working width and car and minibus traffic associated with personnel during the construction period. The number of journeys will be minimised by such measures as sourcing materials locally where available, utilising the working width as far as possible to move plant and equipment along the pipeline route, bussing staff from the Site Establishment Areas to the working areas and minimising the generation of waste. Nevertheless, construction traffic may have localised temporary impacts on other road users, through potential congestion and delays.

Proposed mitigation measures, to minimise disruption, will be detailed in a comprehensive Traffic Management Plan (TMP). The TMP will identify any road restrictions and potential sensitive locations such as schools and hospitals, detail agreed traffic routes, identify any necessary restrictions to ensure safety, specify signage, temporary traffic controls and any additional measures to minimise impacts.

The pipeline will generally be installed under major public roads and railways using non open-cut methods to avoid any disruption. Other roads, farm access tracks and private drives will usually be crossed using open-cut methods. Access will normally be maintained while the pipe is being installed under public roads and measures to reduce impacts on private tracks and drives will be agreed with users.

Very little traffic will be generated when the pipeline is operational and no particular mitigation measures will be required.

14. EMISSIONS

The majority of potential emissions will occur during the construction phase of the pipeline. Potential impacts arise from waste generation, discharges to watercourses, combustion emissions from plant and vehicles, dust generation, transfer of mud onto public highways, light and unplanned releases such as spills. In addition, there will be noise emissions from construction plant and activities.

Waste will be regularly collected from the working width and placed in covered skips or similar containers. Special Wastes, including any contaminated soils identified during construction, will be disposed of in accordance with the relevant Regulations.

A comprehensive Waste Management Plan will be produced identifying likely wastes and appropriate handling and disposal methods. Pollution Prevention, Water Management and Emergency Response Plans will also be prepared. All plans will be agreed with relevant consultees.

Measures to control ground and surface water during construction and prevent water pollution will be implemented, as outlined in Section 9.

In order to control the emission of exhaust fumes and smoke all vehicles and items of plant will be correctly adjusted and maintained. Drivers will be instructed to turn off their engines when not in use.

In order to prevent dust clouds during very dry conditions, water will be sprayed onto the working width to moisten the surface, if necessary, and vehicle speeds will be restricted along the working width.

A high frequency of road sweeping will be used to minimise the accumulation of mud on public roads.

Fuel and oils needed for construction will be stored in bunded areas at agreed locations that will avoid particularly sensitive areas and strict procedures will be used to minimise the risk of spills during refuelling. Specially trained and equipped teams will be used to deal with any spills.

Noise emissions from construction plant and machinery will be controlled in accordance with recognised good practice. Silenced compressors and acoustic covers will be used on plant and machinery. Where residents are in close proximity to the pipeline works, or may be affected by construction noise, they will be contacted in advance and kept informed of operations. The need for any additional mitigation measures, such as acoustic barriers, will be agreed with local Environmental Health Officers, having regard to any particularly noisy operations, such as the use of "peckers" if needed to excavate the pipe trench through areas of surface rock.

A Blasting Management Plan will also be produced, for agreement with the Local Authorities, to cover noise, vibration and dust suppression if blasting is required to excavate the trench in some of the areas of very strong rock crossed by the pipeline route. This will describe the anticipated frequency of blasting, potential noise and vibration levels, and agreed restrictions on timing and conduct of the works.

During commissioning of the pipeline there will be a short period of high noise levels at the test points. Super-silenced equipment will be used to minimise noise generation, and operations causing noise will be limited to a short period. Additional mitigation measures will include the erection of noise barriers if required by local conditions.

15. SOCIO-ECONOMIC

The proposed pipeline will bring positive economic impacts by guaranteeing gas supplies to the UK to meet future demands for natural gas. There will also be economic benefits during construction arising from employment of local people and the use of local services and businesses.

South-west Wales is an important area for tourism. However, no major tourist attractions fall within the Route Corridor. Rights of Way will generally be kept open, as far as practicable, during construction and, while informal recreation is recognised as important, the impacts of pipeline construction will be temporary and localised.

16. ENVIRONMENTAL MANAGEMENT

During the detailed design and construction stages of the project, the key mechanism to ensure that the mitigation measures identified in the ES are implemented, and that best environmental practices are followed, is the Project Environmental Management Plan (PEMP).

In addition, six subject plans will be produced in support of the PEMP, namely the:

- Waste Management Plan;
- Water Management Plan;
- Traffic Management Plan (TMP);
- Pollution Prevention Plan;
- Emergency Response Plan; and
- Reinstatement Plan.

The PEMP and these plans provide a system against which to monitor and audit environmental performance.

In addition to the above, Method Statements and a variety of detailed site-specific plans will be produced to cover all main construction activities. Where appropriate, these will be discussed and agreed with relevant statutory and non-statutory consultees prior to construction commencing.

A comprehensive programme of staff training and briefing will be carried out and activities will be conducted in such a way that impacts on the environment are kept to a minimum.