Daventry Infrastructure Studies

Utilities Infrastructure – Technical Report

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WNDC

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Executive Summary

Introduction

The Milton Keynes – South Midlands Sub-Regional Strategy (part of the East Midlands Regional Spatial Strategy or RSS) has identified that Daventry's population will grow substantially over the next two decades. It has identified that the town of Daventry should grow towards a population of 40,000 by 2021 and that Daventry District, as a whole is expected to continue to grow at an equally steady rate beyond 2021 until at least 2026. This study therefore sets out infrastructure requirements for expected population and dwelling growth for both 2021 and 2026 accordingly.

In order to help West Northamptonshire Development Corporation better understand the implications of these targets for the growth of Daventry in terms of certain types of infrastructure, they have commissioned a series of infrastructure studies from consultants, URS Corporation, ISU Limited and LDA Design.

This technical report covers utilities infrastructure, and sets out a series of preliminary conclusions for the infrastructure requirements in association with the growth set down in the Regional Spatial Strategy (RSS).

Purpose of the DIS

The DIS has been produced in accordance with an initial brief received from WNDC. This brief in turn had been developed and consulted upon in mid-2007 by WNDC and has been developed further as the course of the project progressed following consultation and engagement with partners. The views of several major applicants, who were in discussion with WNDC regarding existing or potential planning applications for development in and around Daventry, were also canvassed when the work was commissioned.

The objectives of the DIS have been refined and are:

1. To identify the likely infrastructure investment priorities for Daventry required to deliver long term sustainable growth as set out in the RSS, and recognise how and when they could be delivered;
2. To evaluate the current infrastructure constraints and opportunities for development in the medium to longer term (i.e. to 2021) and having regard to development up to 2026 and beyond;
3. To consider infrastructure development scenarios (but not to allocate land for development or predetermine planning decisions);
4. To consider how infrastructure could be phased alongside growth;
5. To allow consideration of the relationship between infrastructure investment and growth proposals for the town to assist in making planning decisions in the short to medium term; and
6. to provide an evidence base which may be used by other local planning authorities to support the plan making process for Daventry town as a whole

Key Conclusions - Baseline

The Technical Report has found that the baseline utility infrastructure is adequate for the current population.

Utility provision in and around the town of Daventry is adequate for the current population with the host utility providers being responsible for maintaining system security and matching projected 'organic' growth.

Given the ongoing expansion of the town, pressure on existing utility networks has been increasing and works have been instigated and / or completed by host providers to combat perceived 'risk' areas.

Key Conclusions – Infrastructure Requirements

This Technical Report has concluded that the key strategic additional infrastructure requirements for a population of 45,000 (which would be reached with an increase in population of 20,000 as is likely by 2026) are:

- Electricity: at least 1no. new Primary substation (33kV/11kV) and 'upstream reinforcement' via network adjustment (either transferring demand from one area of the County to another or by upgrading infrastructure); and
- Gas: 'upstream reinforcement' of the incoming gas supplies to the town with works being triggered at set levels

Sustainable Infrastructure

Based on the investigations undertaken, and utilising a mixture of technical and environmental considerations, the report outlines that the eastern side of Daventry would prove more favourable when reflecting upon the various facets of utility work likely to be required, and with the north eastern zone, in the opinion of the author, as being more sustainable.

Glossary

Firm Capacity
The ability of a utility network to maintain supplies in normal operational conditions.

Load
A general term that relates to the impact of energy consumption on a utility network.

Organic Growth
A term that identifies natural growth on a utility network. Typically, this is through changing technology, changes in population habits or expectation, infill development, regeneration, business growth, incoming business into existing buildings.

CHP
Combined Heat Power plant. These relate to plants that are placed locally in a community that generate electricity and utilise waste heat – they can be fuelled via various means including bio-mass (wood chippings or sewerage for example) or gas.

1 Introduction

1.1. Background

1.1.1. This technical report is part of the Daventry Infrastructure Studies. URS, and its sub-consultant Integrated Services and Utilities Ltd, have been appointed by the West Northamptonshire Development Corporation (WNDC) to assist in the preparation of the Daventry Infrastructure Studies (DIS). The DIS will form part of WNDC's evidence base and will be a material consideration that will help to inform decisions about the future expansion of the town and the infrastructure required to support that growth. It should also be of assistance to Daventry District Council in determining planning applications which fall (in whole or part) outside of WNDC's planning functions area or beneath the threshold for determination by WNDC within that area. The DIS will also be used in the development of WNDC's infrastructure delivery programme for West Northamptonshire, within the WNDC Regeneration Framework. This technical report forms part of the DIS.

1.1.2. WNDC has the statutory function of securing regeneration of its three Urban Development Areas (Daventry, Northampton and Towcester) but also has a duty to consider planning applications which fall to it for determination in accordance with proper planning grounds.

1.1.3. This is a wide-ranging multi-disciplinary task, with utilities constituting one of the five infrastructure elements under investigation. In the context of this study, utilities infrastructure encompasses that associated with supplying electricity, gas and telecommunications.

1.1.4. The DIS will be used as a tool to assist WNDC in considering proposals for growth and change to the town of Daventry. It will form part of the WNDC's evidence base and will be a material consideration that will help to inform decisions about the future expansion of the town and the infrastructure requirement to support that growth. Further, the findings of the DIS will be used in the development of the WNDC's infrastructure delivery programme for West Northamptonshire, within the WNDC Regeneration Framework.

1.2. Methodology and Scope of the Report

1.2.1. For the purpose of the Daventry Infrastructure Studies and this Technical Report, utilities covers the electricity, gas and telecommunications network located in and around Daventry.

1.2.2. Given the predominantly desktop nature of the study and the strategic level of analysis conducted, a number of assumptions have been necessary to define the infrastructure needs arising as a result of population growth in the town of Daventry. Such assumptions will be discussed in the relevant sections of this report, and can be broadly summarised as follows:

- Assessment of baseline conditions: This has been the consideration of each network utilising data secured from the utility providers responsible for Daventry
- Infrastructure requirements and programme: The infrastructure requirements for utility networks are based on projected impact with an assumption that utilises historical data as a basis, despite the likely influence of the 'Code for Sustainable Homes' and the pressure to include renewables within the development scope. Utility networks are somewhat dynamic and therefore solution driven – as such, historical approaches to network development are somewhat reactive and reflect a given solution for a particular development
- Cost estimates for additional infrastructure requirements: Costings for utility works reflect the independent assessment by the author utilising knowledge secured from other projects and expertise established via a Consultancy practise. All costs are wholly dependant on development location, layouts, timeframes and 'real time' network analysis given the dynamic nature of the system (i.e. that the status quo remains in that the system configuration currently employed for Daventry remains unchanged). Please note that the costs indicated do not identify whom would incur costs, whether whole or apportioned. This will be dependant upon many aspects including the application process utilised, whom the applicant represents and the perceived impact on the system

1.2.3. The scope of this report is therefore to provide a robust and credible technical evidence base to inform the Daventry Infrastructure Studies. The technical report covers, accordingly; in respect of the baseline infrastructure position; the infrastructure requirements that will accompany growth towards a population of 40,000; and the opportunities and constraints for the delivery of that infrastructure as they affect the development opportunities adjoining the town. The overall aim of this paper is thus to assist and help guide the evolution of the DIS.

1.3. Stage One Report Framework

1.3.1. This Stage One Report is presented in the following format:

- Section Two begins the report by reviewing the relevant operational and deliverability considerations that are pertinent to the provision of utilities infrastructure in Daventry
- Section Three then describes the existing conditions that relate to utilities infrastructure. This includes reviewing the current demand rates for electricity and gas from the town, and the state of the existing infrastructure networks
- Section Four provides a commentary on the considerations associated with sustainable utilities infrastructure provision opportunities
- Section Five commences the review of the infrastructure requirements for the expected growth in population to 40,000 identified for Daventry in the RSS, considering each of the three different utilities in turn
- Section Six divides the town in to sectors and takes the infrastructure requirement assessment further by looking at and analysing the potential infrastructure requirements that would arise from significant development in each sector
- Section Seven continues the theme of understanding the infrastructure requirements of the proposed growth and identifies key trigger points in population and dwelling growth that will be reached and which will necessitate the provision of certain pieces of infrastructure
- Finally, on the basis of the preceding sections and on an assessment of the infrastructure capacity and delivery options, Section Eight identifies the sustainable development scenarios for growth in respect (only) of utilities infrastructure

1.3.2. For convenience, supporting data and other information referenced in the assessment are presented as **Appendices** where appropriate.

2 Relevant Operational / Deliverability Considerations

2.1. The Implications of National Policy for Utilities Infrastructure Provision

2.1.1. It should be noted that matters related to utility networks do not feature prominently or overtly steer planning policy. This is most likely because they are an indirect, yet necessary, consequence of development, particularly when considered in the context of an existing urban area where infrastructure is more likely to already exist, and usually located underground. However, utilities may influence considerations when judging particular proposals and / or aspirations, given that there is often a potential impact upon existing infrastructure from new development, both in terms of diversionary works and / or reinforcement that is required to support new and / or additional 'load'.

2.1.2. The protocols that are followed during the process of assessing utility networks[1] encompass the sentiment and / or aspirations of PPS1 and PPS22, as well as more general criteria that is considered on a wider basis. However, despite the aspirations of national planning policy to encourage the development of renewable sources of energy supply, it must be noted that this may currently have little, or indeed no, impact in terms of reduction on the infrastructure requirement given that most alternative solutions still require the full backing of conventional supply techniques (i.e. a CHP plant is still likely to require the ability to fully switch over to the general grid). As such, and certainly in the short term, the assessment is that conventional utility infrastructure requirements will remain unaffected, regardless of current renewable energy policy.

2.1.3. On this basis, there are pre-determined technical requirements, currently set by Regulatory controls, including Acts of Parliament that need to be maintained. The wider impact on people and businesses, notwithstanding the political ramifications, would be considerable were the assessments made to ignore existing engineering criteria. As such, whilst this report is not meant to detract from the intentions of the PPS guidelines, it is a broad and general commentary of the timeframe of which this report is likely to cover.

2.1.4. As a general assessment therefore, it is anticipated that the majority of the utility connections envisaged will be made via current engineering protocols and utilise infrastructure techniques that remain broadly unchanged from that which has been utilised historically. Ironically, in the case of electricity infrastructure, there is an argument to be made that many, albeit smaller, generating points connected to the overall grid would inherently improve system security – with security being one of the main influencing factors when developing new networks.

2.1.5. This does not necessarily indicate that the investigation into Daventry's utilities infrastructure needs has ignored the aspirations for sustainable development, but in order for these policy aspirations to make significant inroads into predicted infrastructure requirements, there will need to be consistent political empowerment, especially given that current technology is often perceived as costly and relatively untested in the UK market.

2.1.6. While it is indeed possible that the political will could materialise, it is felt that it would be remiss of the Daventry Infrastructure Study to advise on infrastructure that did not anticipate the possibility that the aspirations for dramatic changes in the way in which energy is provided may not, for whatever reasons, materialise.

2.1.7. It is therefore important to recognise the aspirations of the guidelines as being only the first step, given that developments, and their financial supporters, historically will seek to minimise costs to improve profit levels. As such, new technology is unlikely to be embraced until a firm stance is taken or the wider market place accepts the perceived benefits. No doubt, this would then secure benefit for future generations but it is unlikely, to dramatically change the face of utility infrastructure in the next ten to fifteen years.

2.2. Regional Network Operators

2.2.1. Within each area of the UK, there are 'host' network operators whom historically have owned and managed, via various statutory means, the incumbent utility networks.

2.2.2. Currently, the 'host' licensed parties for the Daventry area for each of the respective utilities are as follows:

Electricity

- Central Networks (now part of the E-on Group and historically, under nationalisation, East Midlands Electricity Board)

Gas

- National Grid (formerly Transco although originally British Gas)

Telecommunications

- British Telecom (BT)[2]

1 The protocols are based upon Regulatory controls, the use of sound engineering practice, effective technical design and an assessment on third party influences.

2 It should be noted that other cable companies do exist but these are generally not as integrated as BT and therefore have currently been broadly discounted from the assessment. It is possible that any of the development zones may affect apparatus but this would only be in respect of local works and therefore is considered not to be of a strategic significance at this stage.

2.2.3. Policies, in terms of operational criteria, charging structure and competition, are generally derived from various Acts of Parliament, albeit these are overseen by appointed regulators : for gas and electricity, this is OFGEM[3] and for telecommunications, OFCOM[4] (historically OFTEL).

2.2.4. In addition, it is worthy of note to identify that delivery and operational controls have been somewhat left to the industry to self manage. Therefore different characteristics, particularly when planning systems, may be encountered throughout the UK.

2.2.5. Common to all however is an incumbent obligation to provide basic infrastructure, with specific rules set out in terms of capital expenditure recovery. The provision of basic infrastructure, in terms of design, will subsequently be determined by the loads anticipated by growth.

2.3. Local Supply Considerations

2.3.1. Whilst the host utility network operators are responsible on a more regional basis in terms of supply strategy, the inherent networks required to supply new developments on site may not actually be installed, owned or operated by traditional methods.

2.3.2. Competition has meant that third parties can install a network and then seek adoption by the host operator (broadly following conventional techniques, albeit not using host operator direct labour teams). Under particular circumstances, a third party may also request the host network operator to provide a boundary point of connection and install an 'inset' or 'island' network that is totally independent, in terms of interconnectivity, of the surrounding historical network. The protocols associated with operational targets remain, given that the third party vehicles are basically bound by the same rules as the host operators.

2.3.3. In all circumstances, the networks installed need to be operationally fit for purpose with security of supply, fault management and restoration being current KPI targets.

3 OFGEM regulates the gas and electricity gas markets in Great Britain.

4 OFCOM is the independent regulator and competition authority for the communication industries in the United Kingdom.

3 Existing Conditions

3.1. Study Area Location and Assumptions

3.1.1. In preparing the Daventry Infrastructure Studies it is reasonable to assume, given regulatory expectations, that organic growth, or indeed growth potential identified by local plans, should be considered and planned for by the host operators.

3.1.2. Typically, this is to consider the ramifications of new technology, the ways that people live, the criteria that developers are obliged to work towards, infill development likely and the way that business operates. System upgrades are subsequently implemented and the finances secured, in terms of funding, during regulatory review periods.

3.1.3. If this basis is deemed reasonable then estimating the impact of Daventry's growth upon utilities infrastructure can be achieved by looking at current loads and applying direct correlation via a pro-rata approach (albeit with benchmarking against historical loads to give credence to the overall tactic). This approach therefore considers, by default, that the increase of residential units inherently requires employment, local community facilities and schools to match at a similar ratio to that currently utilised. The mix of the actual requirements will develop over time and these will reflect a final load profile.

3.1.4. Notwithstanding the loading aspects, ongoing security of supply, cost and delivery play a significant role and all of these factors will influence the ultimate design. The balanced view therefore is to consider the overall implications of growth, whilst recognising that regulatory obligations will insist upon pre-set operational criteria being achieved. Typically, this is to target security and quality of supply. It is important to note however that this approach, in some circumstances, may not always prove wholly supportive of the aspirations of the PPS guidelines.

3.1.5. Nevertheless, for reasons given above – it is currently considered to be the most prudent approach to planning for the infrastructure requirements of Daventry as it grows in size and population to 2021 and beyond. The requirements of the national Code for Sustainable Homes, the local (DDC/SNC) energy SPD and the wider political intentions in relation to energy efficiency, and indeed renewable energy, may assist in the longer term in reducing demand.

3.1.6. The assessment of any utility network therefore needs to consider various facets that may restrict, or indeed encourage, development growth. Typically these can be split into the following categories:

a. Existing apparatus that is located within potential development zones – primarily this category takes in the strategic utilities infrastructure network given that it is this infrastructure that will involve significant cost, or incur long lead in times, should modification be required.

b. Strategic network 'benchmarks' – this is to establish existing definition of capacity currently available within the Daventry area (recognising that some capacity may be allocated to an interrelated zone - for example, security for the west side of Northampton).

c. Strategic network 'trigger points' – the points at which the system requires significant capital injection to secure ongoing security of service and / or establish additional capacity. In some instances, this will need to be considered at various levels given that there is interaction between groups and / or levels.

d. Secondary network 'issues' – this is unlikely to generate significant obstacles to the process but may be an important consideration that can recommend or promote, or otherwise, a development proposal, particularly if this directly affects existing stakeholders.

3.1.7. Given that all utility networks are dynamic, historical reviews and subsequent predictive assessments are utilised and frequently updated. Although this is a generally reliable method of forecasting future demand, it should also be noted that 'rogue' elements may heavily bias eventual outcomes. As an example, if Daventry is successful in attracting employment zones that encourage high-end energy users (data centres demonstrating this particularly well), the growth seen on the utility networks, perhaps more than other infrastructure influences such as transport, will far exceed that which was initially predicted. Conversely, a disproportionate quantity of say B8 distribution, particularly non-refrigerated, will incur a lower than anticipated utility network growth.

3.1.8. The current protocol assumes that Daventry will continue to attract a similar mix of employment opportunities to those already seen.

3.1.9. The focus to date has been upon technical assessment – of course, there are other facets that merit discussion and these are to be considered and recorded:

a. Financial implications of the works required, including any perceived impact upon 'tariffs' (e.g. s106).

b. The influence of 'the green agenda'. In particular, DDC's proposals (currently studied by MWH) for biomass fuelled combined heat and power, which, if implemented, would be likely to reduce new demand for gas, and may, if applied to existing properties as well, result in a net reduction in gas demand. These proposals, however, would be likely to have little impact on the electricity connectivity requirements because of the need for 'back up' power in the event of CHP system failure.

3.2. Utilities Usage / Patterns

3.2.1. Electricity: 2006 figures reported by Central Networks identify a load of circa 33.4MVA for Daventry town.

3.2.2. Gas: 2006 figures reported by National Grid identify a peak load of circa 10,000m3 for Daventry town.

3.2.3. Telecommunications : It is not possible or indeed necessary to identify a usage rate for telecommunications and therefore a usage rate has not been identified.

3.3. Existing Electricity Network

Background

3.3.1. As a brief synopsis, electricity is distributed throughout the UK utilising varying voltage levels that are subsequently transformed until the value gets to a nominal European standard of 230V single phase (which is what most homes have).

3.3.2. Typical voltage levels are therefore 400,000V or 400kV (National Grid), 275kV (National Grid), 132kV (local distribution network operator or DNO – in the case of Daventry this is Central Networks), 33kV (DNO), 11kV (DNO) and LV (DNO). There are other voltages (66kV and 6.6kV) that some systems utilise but the above is considered accurate for the report zone.

3.3.3. Central Networks are, as are all DNO's, obliged to meet many technical criteria but the two of particular significance for the purpose of this report are voltage quality (in the case of a house – 230V plus 10% minus 6%) and security of supply. This latter item is to ensure that areas are not disadvantaged for any longer than is necessary albeit that different levels are applied as to what is acceptable. Broadly speaking, this means it is more acceptable for a single house be without electricity longer than, for instance, a whole town.

3.3.4. The time frames range from seconds, or fractions of, to hours, unless there are situations that are over and above the norm (e.g. the floods of 1998 in Northampton) when extenuating circumstances can be used as justification for slow restoration of services.

3.3.5. Failure under normal operational conditions can involve heavy financial penalties from the relevant Regulator (OFGEM), notwithstanding the public relations elements.

Baseline Infrastructure Position

3.3.6. Daventry, being of reasonable size, is served via a single bulk supply point (BSP) located in the vicinity of Norton Road to the east of the town centre, with main double circuit 132kV overhead tower feeds entering the town from the north east.

3.3.7. The source of the 132kV circuits is Coventry, albeit this is fed from a common supply that also 'feeds' Rugby.

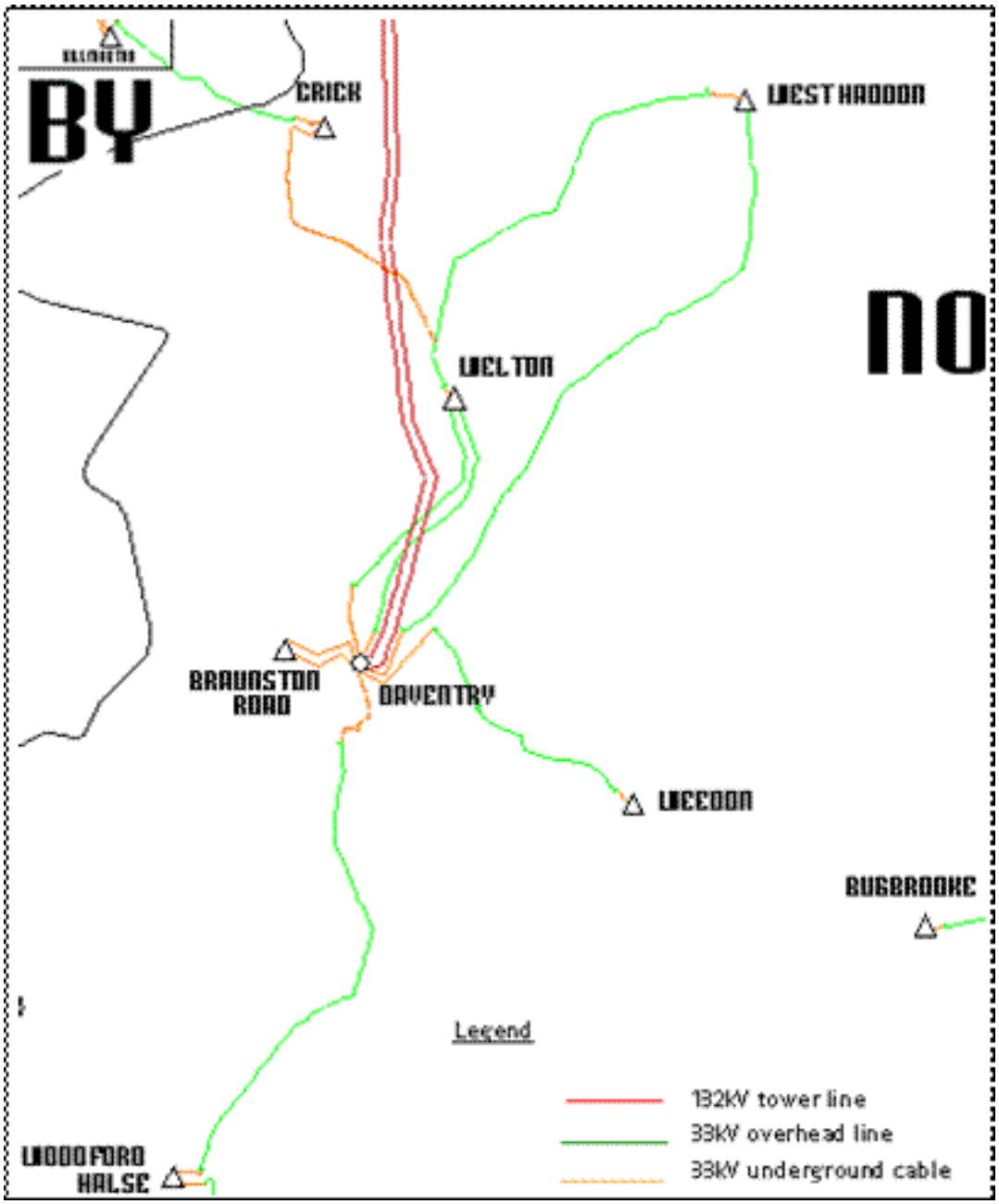
3.3.8. As shown in Figure 3 1, the BSP then affords secondary strategic feeds, at 33kV, to several locations within the immediate area, including Weedon, Woodford Halse, Welton and the town itself (Braunston Road primary substation).

3.3.9. The security of supply for the system is based upon 33kV and 11kV interconnection whereby loss of one circuit does not penalise the overall system.

3.3.10. In broad terms however, Daventry stands independent from other development zones, such as Towcester and Northampton, given that they are supplied from different sources. However, it would be incorrect to consider that there is no correlation, or indeed secondary reliance, when considering strategic reinforcement options or load availability.

3.3.11. Current peak loadings within the Daventry area are 79.4MVA, although only 33.4MVA is attributable to the town supplies (i.e. only approximately 41% of the current peak loading occurs as a result of demand from within the town of Daventry itself). Of this, 22MVA is located to the west of the town at Braunston Road Primary substation, with the remaining 11.4MVA being placed at Daventry BSP.

Figure 3-1 - Central Networks schematic layout



Source: Central Networks

3.3.12. Central Networks have recently concluded the upgrading of Daventry BSP via the installation of 90MVA transformers[5], realising a firm capacity[6] within the group of 117MVA. However, it is worthy of note that whilst the circuits maintain this load position, the security of supply requirements do not. This is not an unusual position given that regulatory obligations, at certain trigger points, activate to safeguard supplies.

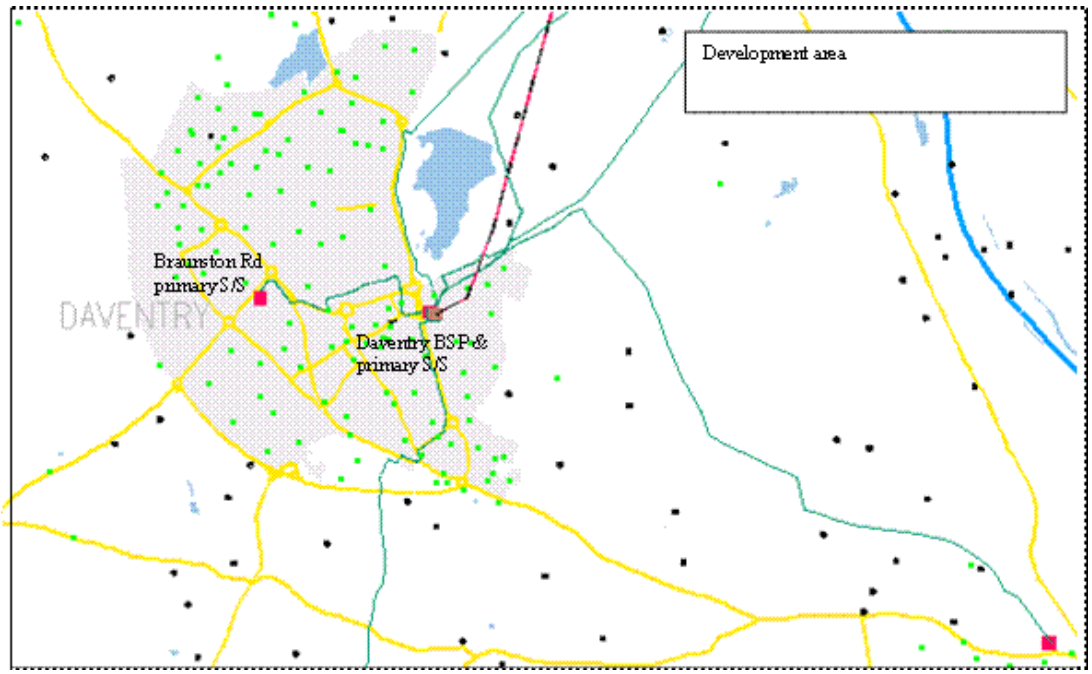
3.3.13. In this case, the trigger point is 100MVA and there is an inherent obligation upon Central Networks to instigate investment to ensure that the restoration of supplies meets with approved criteria. There is no plan currently for this given that there presently is a 25% contingency and this falls well within the previously identified organic / local development framework expectations[7].

5 This information was obtained during discussions with Central Networks and forms part of revised information that is not yet shown in published strategy documentation (by Central Networks).

6 The term 'firm capacity' refers to the capacity that can be maintained in the event of failure of the normal operational condition.

7 This information derived during discussions with Central Networks.

Figure 3-2 - Central Networks 132kV (red dashed) and 33kV (green) circuits routes on broad geographic background.



3.3.14. Other electrical constraints identified do not generally cause major issues. This is clarified within the mapping exercise that has been undertaken to identify the potential development scenario.

3.4. Existing Gas Network

Background

3.4.1. As a brief synopsis, gas is distributed throughout the UK at various pressure levels that are subsequently reduced until the value reaches a point at which it can be reasonably utilised. This can vary between application however, as the pressure into a dwelling may be different to that of an industrial premise.

3.4.2. Typical pressures are therefore high, intermediate, medium and low.

3.4.3. In the case of Daventry, the distribution into and around the town is via National Grid. National Grid, as are all other transporters, is obliged to meet many technical criteria including that of quality of supply and pressure.

Baseline Infrastructure Position

3.4.4. Daventry is currently supplied from a strategic high-pressure station located at Long Buckby, some 8km to the north east of the town. At this juncture, pressure is reduced, via a regulator or Pressure Reducing Station (PRS), to IP (intermediate pressure) and the gas is transported to Daventry via a system of underground mains.

3.4.5. The present supply strategy for Daventry is based upon the main feed from Long Buckby, with a smaller, and lower pressure, alternative afforded from the A45 at Harpole (a village located between Northampton and Daventry).

3.4.6. The Daventry main intake, located on the Welton Road adjacent to the Grand Union Canal, reduces the incoming intermediate pressure to medium pressure (MP). It is this MP main that subsequently affords a ring main to the town and the element of security of supply.

3.4.7. Supply wise for most premises, the pressure is once again reduced to low via secondary pressure reducing stations and it is this network that presents itself to most residential units. These secondary pressure reducing stations are located around the town.

Baseline Spare Capacity Assessment

3.4.8. Presently, the available capacity on the network equates to circa 500no. residential units, or circa one year's development, assuming that no organic growth, developments already coming on line and / or business requirements limit this. Beyond this value, significant implications occur to resolve gas supplies.

Potential Demand Increase Implications

3.4.9. Peak loads established for the Daventry area, either during or prior to September 2007, reflect a peak demand of circa 10,000m3. Therefore with the increase in population, linked with the inherent employment, schooling and local centre requirements, an additional energy consumption of 8,500m3 is considered likely at this stage. This computation is an assessment utilising historical figures, together with current organic growth predictions and the new load likely to be seen as a result of increased development. Please note that the basis of assessment is from a known actual load and therefore this excludes any loads that have since been applied for or indeed were already applied for at the time of review.

3.4.10. However, the impact of the Code for Sustainable Homes, changes to Building Regulations, the local (DDC/SNC) Energy SPD and the wider political intentions in relation to energy efficiency and renewable energy, in combination, could potentially reduce demands for gas for space heating and, to a lesser degree, water heating.

3.5. Existing Telecommunications (BT) Network

Baseline Infrastructure Position

3.5.1. For telecommunications we are able to confirm the following about the infrastructure network serving Daventry:

3.5.2. The BT network was historically served along trunk road routes. In the case of Daventry therefore, this would be the route of the historical A45 as this was the main link that ran from Northampton to Coventry, and onto Birmingham.

3.5.3. Broadly, the BT network is fed via a central exchange located within the town and this, given that technological advances are generally reducing spatial requirements, will be able to readily support the new requirements.

3.5.4. The existing system utilises a mixture of local and non-local fibre optic, and non-fibre, cable networks.

3.5.5. BT, particularly in urban areas such as Daventry, has an integrated duct system that houses the cabling. The advantage of this is that as technology changes, cables can be replaced without necessarily requiring highways to be affected by the excavation of new trenches.

Potential Demand Increase Implications

3.5.6. As with all the utility networks, BT will need to forward plan for the town's growth. However, the system implications, particularly compared to electricity or gas, are generally considered less onerous – certainly, when assessing environmental / stakeholder impact; i.e. it is considered that major works will not be required (in terms of ground excavation and the inherent natural resource required) and this, consequentially, is likely to limit the inconvenience on the local population, businesses, Local Authorities etc.

3.5.7. Additionally, new infrastructure is anticipated to include latest technology (for example, broadband) and to comply with the requirements of the 'Code for Sustainable Homes'.

3.5.8. As such, it is not considered necessary to identify a sustainable infrastructure strategy for telecommunications .

4 Sustainable Utilities Provision Considerations

4.1. Introduction

4.1.1. The most obvious locally derived renewable / sustainable approach is the generation of electricity utilising lower carbon technology. However, as previously identified, it is currently anticipated that the same level of basic infrastructure and interconnectivity with the surrounding and historical utility network remains required at this juncture.

4.1.2. The historical electricity network has not, in general, been readily designed to accommodate generation projects although, within the right framework, there are options available to secure connections. Indeed, within the immediate Daventry zone, there are three local generation projects already active, adding a total of some 4.8MW of capacity (or in crude terms enough electricity / gas / energy to supply the equivalent of some 2000 – 2400 gas centrally heated residential units). These generally being of larger capacity (1MVA or above).

4.1.3. In all instances, an assessment needs to be undertaken to ensure that technical characteristics for connection are satisfied.

4.1.4. With regard to the local generation units themselves, the general accepted norm is that all units capable of generating up to 5MW would be connected onto the 11kV system, whilst those above this threshold would be connected onto the 33kV system or above. This is not an absolute position given that Central Networks will assess the technical characteristics as and when formal application is made for connection to the network.

4.1.5. Individual smaller 'domestic' generators that export to the network (wind turbines / solar panels for example) can be connected to the local 400v / 230v system but, again, this is an evolving market and subject to the same technical assessment detailed above.

4.1.6. Current technologies are looking at domestic CHP via the waste heat derived from a conventional boiler, or the use of ground source heat pumps that are effectively a refrigerator in reverse, with coils installed under soil, or indeed deep drilled, within the curtilege of the property. This latter approach is currently working commercially for 'district centres' but is not yet readily accepted for 'mainstream' use.

4.1.7. Wider schemes include the use of more centralised systems, based upon CHP or wind turbines.

4.1.8. Predominantly, any choice made needs to reflect an outcome that affords all the criteria, or indeed better, that the wider population currently enjoys via conventional techniques.

4.1.9. The basis of all techniques however is that the application of renewable projects still requires connectivity with the wider utility system on the basis that security of supply to the wider population is paramount (i.e. if the wind does not turn the turbine, expectations are that electricity remains available). This assertion therefore means that the design of the utility networks needs to reflect 'what if' scenario's – as an example, if the wind turbine is unable to directly service the local population due to a fault or low wind power, the fallback position will be to draw energy from the national grid. This inherently means that the utility network still needs to be designed to fully accommodate the load as if the wind turbine wasn't present.

4.1.10. The natural conclusion is therefore that low carbon electricity generation is achieved but this does not of itself reduce infrastructure requirements.

4.1.11. If this conclusion presents an accepted position then the report covers the infrastructure requirements deemed pertinent for the full period.

4.1.12. The wider position is that the population expectations continue to grow – generally, rural areas expect / demand that electricity is provided without interruption and telecommunication speeds are identical to that of major conurbations.

4.1.13. Furthermore, the review of sustainable options will need to balance against real and practical issues. For instance, a biomass CHP operation utilising wood chippings may seem ideal in terms of a sustainable approach but consideration needs to be given to the provision of an ongoing fuel source, and the potential environmental impact that could result from the associated production and transportation. Examples for a wood chip biomass unit therefore could include:

- The use of locally grown material, transferred in whole or chipped form via lorries with a maximum distance employed
- The use of imported material, transferred in whole or chipped form via ship, rail, lorries

4.1.14. The final assessment needs then to consider the benefit to Daventry and this is addressed via a simple question: is the use to include the whole of the town or is the technology going to be applied solely to part, or indeed the whole, of a new development. Of course, there is an approach that could include both scenarios with countries such as Austria and Denmark utilising technology on both a single building basis or on a more substantial level.

4.1.15. There is also a supplementary consideration on whether the excess heat should be engaged as part of a district-heating scheme. Certainly, countries such as Austria and Denmark utilise this technology on both a single building basis or on a more substantial level.

4.1.16. A more substantial level would involve the management of a system that is effectively 'private'. The concept of how customers then secure energy changes from that currently enjoyed (people have the ability to decide on which energy suppliers they use); from an operational perspective, the security of the supply is heavily regulated and therefore the system would need to be appropriately managed to reflect the current requirements.

4.1.17. Current Regulatory conditions do not encourage the application of alternative approaches to deliver energy as the system is currently set to clearly delineate generation, distribution and supply; as such, until OfGEM considers the context of Regulation, there is little ability to pursue 'step change' in the approach to sustainable development.

4.2. Sustainable Energy Provision by Daventry District Council

4.2.1. At the time of researching and compiling this baseline report, MWH were in the process of undertaking an assessment of sustainable energy options available for Daventry, commissioned by Daventry District Council with support from Northamptonshire Enterprise Limited.

4.2.2. The appointed Consultancy team is reviewing all forms of approaches and has thus far concluded that only (a) wind, and (b) biomass, either as pure heat, pure electricity generation or CHP, are viable and appropriate. The work, including engagement with stakeholders, is continuing.

4.2.3. The impact of the outcome upon this report may be negligible in that the recommendation could be to utilise conventional / historical connection policy without any form of sustainable approach. Alternatively, of course, options may be presented that may mitigate elements of the work currently commented upon.

4.2.4. If there is any reliance upon the existing utility networks, there are numerous considerations that will need to be managed; not least of which will be the issue of interconnectivity with the appropriate networks.

5 Utilities Infrastructure Requirements

5.1. Population Growth and Dwelling Development

5.1.1. Infrastructure demand is a function of population and dwelling growth.

5.1.2. The assumed population figure of about 40,000 people for the town of Daventry by 2021 is derived from paragraph 124 of the Milton Keynes and South Midlands Sub-Regional Strategy (MKSM SRS), which constitutes part of the RSS. The population of Daventry in 2007 has been estimated at 25,379[8]. Taking this figure, it was estimated that there are approximately 10,192 dwellings in Daventry[9]. If all of this growth were to be accommodated within or immediately adjacent to Daventry's urban settlement area, then the town could be expected to grow by another 6,337 dwellings (assuming an average household size of 2.42 persons[10]) and at least 14,622 people. Table 4-1 provides a summary of these assumptions.

5.1.3. This growth forecast for the town is in the context of stated RSS policy that the entire Daventry District area (i.e. the town and the rest of the district) should grow by 540 dwellings per annum between 2001 and 2021. Assuming growth in the town of 453 dwelling per annum equates to the town assuming an 84% share of the growth in dwelling numbers expected of the District.

5.1.4. At the present time, the draft RSS introduces an extension of the planning period to 2026 during which time it is identified that the entire Daventry District local authority area would be required to make continuing provision for housing growth at the same annual average rate of 540 dwellings per annum over the plan period[11]. Assuming that the town continues to absorb the same proportion of development (within the District) after 2021, as it does before – it could be expected to grow by a further 5,222 people and 2,265 dwellings in the ensuing five year period. These assumptions are summarised in Table 4-1

Table 4-1: Population and Dwelling Increase Assumptions, 2007 - 2026

Relevance / Status:	Population (Actual or Expected)	Dwellings (Actual or Expected)	Likely Year / Time Period	Daventry AHS (NCC Projection)
Census Record:	21,774	8,837	2001	2.46
Estimated Baseline:	25,379	10,192	2007	2.49
MKSM Figure:	40,000	16,529	2021	2.42
2026 with continued constant growth:	45,222	18,792	2026	2.41
Estimated Increase:	**+ 14,622**	**+ 6,337**	**2007 - 2021**	**NA**
Estimated Increase:	**+ 19,843**	**+ 8,600**	**2007 - 2026**	**NA**

Source: URS calculations derived from various information sources including ONS Census Data and Mid-Year Population Estimates, DDC Dwelling Completion estimates, NCC estimation of existing and projected average household size in Daventry.

5.1.5. A critical output of the DIS is the estimation of the key trigger points[12] for new infrastructure. Most trigger points will be judged in terms of the increase in population and/or the increase in dwelling numbers. In order to identify the increase in population and set this against an approximate date (in this case a year) the DIS uses the MKSM SRS population of 40,000 for the year 2021 applying an even rate of population increase over that period, as shown in Table 4-2.

Table 4-2: Simplified Population and Dwelling Increase Assumptions, 2007 - 2026

Relevance / Status:	Population (Actual or Expected)	Dwellings (Actual or Expected)
Annual Growth	1,044	453

Source: URS calculations

5.1.6. It should be noted that these annual growth rates are an average and growth in terms of population and dwelling completions is likely to vary from year to year depending on the availability of developable land, economic circumstance and other factors. It is however a useful starting point when projecting growth over a medium to long term period.

5.1.7. Utility wise, the impact of any growth will be dependant upon the capability of each network at the time of application to the host network operator (i.e. Central Networks, National Grid or BT) given that all utility networks are dynamic and ever changing.

8 This figure was estimated using ONS mid year population projections for 2001 to 2005 and extrapolating forward to 2007. The methodology used was confirmed as the best available by K. Palmer, Senior Research and Information Officer, Planning and Growth Department, Northampton County Council and also agreed with DDC.

9 This is based on an average household size of 2.49. Figure supplied by K. Palmer, NCC, 14/02/08.

10 Average household size figures obtained from K. Palmer, NCC, 14/02/08.

11 This number is specific to the whole local authority area rather than for the town of Daventry in isolation.

12 The term trigger point refers to a certain population level, or number of dwellings, which once reached triggers the requirement for additional infrastructure because existing spare capacity has been used up by preceding population and/or dwelling growth. It is a useful concept for identifying the stage at which new infrastructure must or should be provided.

5.1.8. Notwithstanding historical assumptions and load profiles, there is also new technology and / or aspirations that may impact upon real growth.

5.1.9. In respect of employment uses, the there is an absence of guidance from either the RSS or emerging LDF on the precise amount of employment development that will accompany the growth in population. For this reason, in respect of the infrastructure types being considered, and particularly in the case of transport and utilities, a pro-rata demand function was used. For the sake of simplicity, this assumed that the employment characteristics of the District area would remain broadly as they are now (i.e. that the mix of employment types). Hence, it was assumed that the demand for transport and electricity and gas would grow from current levels proportionate to the increase in population to provide a reasonable starting position[13].

5.2. Infrastructure Requirements for population of 40,000

5.2.1. The required 'headline' major pieces of infrastructure are:

- Strategic Electricity (capacity issues): 33kV and / or 132kV circuits to afford full capacity at Daventry bulk supply point (BSP) via the application of new cables or overhead lines from either Rugby or Bugbrooke;
- Strategic Electricity (connection options): the extension of the 33kV and 11kV electricity network to the development zones and to include a new 33kV / 11kV Primary substation and / or reinforcement of existing infrastructure;
- Local Electricity (connections): in conjunction with the strategic elements, the 11kV network will be extended through out the site to afford connectivity via the installation of secondary substations;
- Strategic Gas (capacity issues): the upgrading of the incoming intermediate pressure gas main that lies between Long Buckby and Daventry, plus potential works at the main Long Buckby pressure reducing station, if required, and;
- local Gas (connections): in conjunction with the strategic network, extend the medium pressure mains to site to afford connectivity

5.2.2. Infrastructure requirements for the gas and electricity networks generally show that the provision for future growth is mixed, and that significant works are likely to be required. This may take some time to deliver given that, in some instances, no further works are currently planned. As an example, Central Networks, operators of the electricity system, have recently concluded works to the main incoming station at Daventry but it is predicted that the projected loads from the RSS growth targets will exceed that available.

5.2.3. The following list summarises the key issues associated with this infrastructure assessment. These issues define the sustainable infrastructure strategy for utility infrastructure growth through to 2021:

- Developers, local and regional planners must work closely with BT, Central Networks and National Grid during the strategic development process in order to align future projections and plans. Failing to identify likely impacts may cause significant delays of 5-years or more
- Utility networks are constructed on an as-needed basis because they are paid for by a mixture of potential sources, including the developer. Without the momentum and early commitment from a developer, Council or WNDC, works are unlikely to proceed
- Development in the northeast sector of the town may be more cost effective, utilise fewer resources and reduce environmental impact over development in any other section in terms of utility infrastructure. However, no development zone is ideally located to all incoming existing strategic resources

5.3. Key Detail at Town-wide Level - Electricity Network

Future Demand Prediction

5.3.1. The amount of development being considered for Daventry by 2021 means that existing capacity is extremely unlikely to be sufficient for the duration of the planning period being considered. Obviously any additional growth beyond a population of 40,000 people will further increase the capacity that is required.

Demand Increase / Infrastructure Requirement Assessment

5.3.2. Current predictions for the Daventry area, in addition to load already allocated from Central Networks pre-planning exercises, identify an increased load profile of 20-25MVA. Therefore the 100MVA threshold that is currently the next 'trigger point' would almost certainly be achieved, unless, of course, significant advances are made with regard to renewable options that do not place a requirement upon existing infrastructure (e.g. standalone CHP systems).

5.3.3. Capacity wise, Central Networks anticipate that their system is able to take circa 37MVA, albeit that only circa 20MVA can be achieved without significant modification to the existing configuration.

5.3.4. The ability to utilise the full 37MVA will require significant early planning.

5.3.5. The immediate potential capacity available, given the sizing of the local strategic transformers and not the incoming circuit abilities, is circa 15MVA, although it is unlikely that this would ever be realised in its entirety due to the configuration of the network.

5.3.6. As such, there is every likelihood that at least one, if not two, primary substations (33kV/11kV transformation points) would be required and these would be best placed within the 'load centre' – i.e. the new development.

13 It is acknowledged that the mix of industry and employments uses, and hence demand for infrastructure services, may depart substantially from the mix that currently prevails. However, it was not within the scope of the DIS to examine likely future employment trends and mix. Therefore, the approach that has been taken is considered the best available.

5.3.7. From the new Primary substation, 11kV infrastructure would extend to more local distribution substations whereby the voltage is again transformed to 400V or 230V.

5.3.8. Low voltage networks, particularly the case for the residential elements, would then extend to afford service connections.

5.3.9. If large commercial loads are required, it is normal for the 11kV system to serve these directly as the system is designed slightly differently to both aid the large users as well as protect the residential units from seeing dips in lights from occurrences, such as motors starting up.

Infrastructure Provision Options and Implications

5.3.10. The options likely to be considered to extend the system to the full 117MVA capacity will involve a review of the 33kV system interconnectivity, as well as the 132kV characteristics. This is borne out by several preferences and considerations, not least cost, planning and delivery issues.

5.3.11. The regulatory cost apportionment process would normally consider that the planning and cost for any works at the 132kV level would be undertaken and borne by Central Networks as part of their long term planning process, although a large capacity user could be required to make a contribution. This would have to be a major new energy consuming installation or facility however and a good local example would be something as significant as the Corby Steelworks in the 1960's.

5.3.12. Timescale wise, the lead in would be at least 5-10 years, particularly if the options required, as a first preference, involve the use of overhead lines. Landowners, potential public inquiries and compulsory purchase orders are all likely to influence decisions, particularly if negotiated options are not achievable.

5.3.13. With regard to the town itself, Braunston Road primary substation has a current life cycle until 2009 when the capacity currently utilised and the growth anticipated from existing customers, even without the impact of new developments in the immediate area (for example, Drayton Fields), will exceed secure capacity.

5.3.14. To put this into context, Braunston Road currently operates at 22MVA with a maximum firm capacity of 24MVA.

5.3.15. Again, options may exist to transfer elements of load through existing 11kV network onto the Daventry BSP but this has not yet been assessed or deemed required.

5.3.16. Daventry BSP does have options available given that it is running at 11.4MVA with a reported maximum firm capacity of 26.4MVA.

5.3.17. At this juncture, it is worth noting that just because capacity is available at source, it does not necessarily mean that it is readily accessible, or indeed available at all, as the configuration of the network is dynamic and heavily integrated. Central Networks, as part of their management process will determine the options available as and when firm loads are requested.

Potential Infrastructure Diversion Requirements

5.3.18. There are a number of key considerations for identifying sustainable infrastructure for electrical infrastructure; these are discussed below.

5.3.19. The development process is likely to involve the relocation of apparatus (e.g. existing power lines, pipes, etc), some significant, and the timescales required to carry out such relocation could restrict early day access to development sites.

5.3.20. The general rule of thumb is that the higher the voltage, the greater the cost and timeframe required to relocate the facility. As an example, 132kV and 33kV overhead lines cross one or more of the potential growth areas adjacent to the existing town and to relocate this would take one to two years, assuming that all aspects were readily managed. More realistically, this would more than likely encompass three to five years, particularly for the 132kV works.

5.3.21. The options include leaving the apparatus in its existing location and designing out the requirement for relocation, or undertaking a full relocation to a new position that maintains the security of the system. Generally, and utilising the overhead line scenario as an example, this would involve the use of underground cable.

5.3.22. The disadvantages of overhead lines being retained through developments, particularly at the higher voltages, are the perceived link of electro magnetic fields, or EMF's, and leukaemia, or similar illnesses. Whilst no scientific link has been identified yet, the perception, much like that of mobile telephone masts, is that there is a threat to health.

5.3.23. Furthermore, the relocation of overhead line to underground cable offers further benefits such as improved aesthetics and safety (particularly relating to the use and enjoyment of public open space).

5.3.24. The author notes that the relocation of apparatus such as overhead lines with underground cable can incur environmental penalty – not least, for example, the use of natural resources when reinstating trenches. The balance, when considering the implications of selecting a development site, rests on the advantages and disadvantages of the works involved. Although, if there are synergies relating to the new development infrastructure and the relocation of the existing apparatus, there is added merit.

5.4. Key Detail at Town-wide Level - Gas Network

Future Demand Prediction

5.4.1. The amount of development being considered for Daventry by 2021 means that existing capacity will not be sufficient for the duration of the planning period being considered, unless this demand is significantly reduced. Obviously any additional growth beyond a population of 40,000 people will further increase the capacity that is required.

Demand Increase / Infrastructure Requirement Assessment

5.4.2. The National Grid system can currently accommodate only the equivalent of approximately 500no. residential units without significant modification to the existing configuration.

5.4.3. The considered requirement is circa 8,500m³ for the increase in population and therefore the thresholds for the next two 'trigger points' would almost certainly be achieved, unless, of course, significant advances are made with regard to renewable options that do not place a requirement upon existing infrastructure (e.g. standalone CHP systems).

5.4.4. The ability to utilise the full 8,500m³ will require significant early planning.

5.4.5. The immediate potential capacity available, given that this is not reserved for new developments, is likely to be consumed within the first twelve months, if not before, of the period under consideration.

5.4.6. Even with capacity available, the existing medium pressure network would be extended to the development zone where a further pressure reducing action will occur to deliver a low pressure facility.

5.4.7. From the new pressure reducing station (PRS), it is anticipated that low pressure network would then extend to provide local distribution and final connections to each residential property.

5.4.8. If large commercial loads are required, it is possible for the medium pressure system to serve these directly.

Infrastructure Provision Options and Implications

5.4.9. As each trigger point is projected to be reached, a series of works will be required to increase the capacity of the existing network infrastructure in order to meet the expected demand from new housing.

5.4.10. The works to afford the ultimate solution or sustainable infrastructure strategy for gas can be split into three phases:

- Firstly, the initial resolution is likely to require the installation of circa 3.2km of 180mm HDPE (high density polyethylene) main. However, this would only afford an increase in general capacity of circa 3,500m³, sufficient to guarantee gas supply to new development for approximately a further 5-6 years assuming current rates of demand hold. This will be subject to the ongoing system management process by National Grid whom will consider this proposed growth agenda with that of surrounding areas and the incumbent influences
- Beyond this, a scheme to further install circa 3.6km of 315mm HDPE between Long Buckby and Daventry is required (partial route), along with upgrading works likely to be required at the main station in Long Buckby. Again, this is subject to review and technical computations by National Grid. The principles of both upgrades being to replace sections of existing main that currently are deemed likely to be undersized
- The final phase of the works, which may ultimately not be required, involves a complete overlay of the network between Long Buckby and Daventry, together with a complete rebuild of the regulator at Long Buckby main PRS. This is currently determined at a trigger point of 20,000m³

5.4.11. The costs for the works would be considered using the financial modelling utilised by National Grid and subsequent third party contributions deemed pertinent; all of which are overseen by the Regulator, OFGEM. Typically, the attributable costs would be split between National Grid and the developer, albeit with current market conditions (companies wanting to own utility assets), these are often reduced to zero, or even returned cash in the form of a rebate (i.e. the developer gets the gas network for free or even a financial incentive).

5.4.12. The medium pressure mains within the town are currently deemed fit for purpose by National Grid and no works are planned at this stage. Again however, National Grid will determine this at the time that formal load applications are made as it is this process that establishes a specific load profile and the ultimate point of connection.

Potential Infrastructure Diversion Requirements

5.4.13. No significant diversion works are currently identified.

5.5. Key Detail at Town-wide Level - Telecommunications Network

5.5.1. The current available strategic capacity on the BT network is currently not considered to be an issue. Whilst there would be planning required from the network operators, there are not the inherent implications for infrastructure and development planning that there are for that have been identified with the gas and electricity networks.

5.5.2. It is anticipated that BT will extend their network, via an underground-ducted system, to the boundary of any site, whereby the Developer will then extend this to afford ongoing connections.

6 Sector Level Infrastructure Assessments

6.1. Sector Level Infrastructure Assessments

The Town Centre

6.1.1. Whilst the strategic capacity needs to be considered, significant new utility infrastructure to the development zone would not be required. The maximum potential dwelling increase is 500, which equates to a population increase of 1,220. These dwellings, particularly if spread throughout the town centre, may be able to tap into the existing networks with only limited reinforcement of existing infrastructure to accommodate the new capacity being potentially required.

6.1.2. The details of this development on the existing infrastructure would have to be evaluated using development site specifics and the wider design process employed by the varying parties.

6.1.3. Load profiles would equate to a maximum of say 500m3 of gas, 700kVA electricity wise and circa 600no. telephone lines. None of these loads are significant in their own right, other than the gas load would utilise all the current capacity currently available. Realistically, and depending upon the location / numbers / heating types / dwelling sizes, these loads would be diversified so that actual impact on the utility networks may be reduced.

6.1.4. Other than local diversions that may be deemed necessary, say for new accesses, it is unlikely that there will be any major impact on existing networks.

The South East Sector

6.1.5. The maximum potential number of dwellings in the southeast sector is estimated to be 6,438. This would equate to a population of approximately 15,580 depending on the average household size of those dwellings.

6.1.6. The estimated utility demand without consideration for any other sectors reflects a load of 6,470m^3 of gas, 21.5MVA of electricity and circa 7,000 telephone lines, albeit the figures may be subject to further diversification.

6.1.7. With the exception of BT whom will generally uprate their line capacity without necessarily causing major intrusive works, the electricity and gas networks will require significant upgrading.

6.1.8. Taking each in turn, the electricity can accommodate the load on the existing strategic transformers but the incoming circuit capacities will be subject to review as it is likely that the next trigger point will be actioned. This will necessitate a review of the 33kV and the 132kV incoming circuits with a long lead in time should works be deemed necessary. Typically, this could be an interconnection locally to Bugbrooke from Weedon, or more strategically via a new 132kV configuration from Rugby / Coventry. Planning and local objections, particularly if of overhead construction, is likely to restrict delivery.

6.1.9. Gas wise, the immediate available capacity will be exceeded as will the interim stage that can accommodate circa 13,500m3 of gas. This is not necessarily detrimental given that the process can then plan accordingly and be developed into a long-term proposal for Daventry.

6.1.10. Diversion wise, 11kV and 33kV electricity systems may be impacted upon and these could need to be accommodated within some development proposals. No gas diversions have been identified but during the review exercise, an oil pipeline which is not included within the remit of the appraisal, is potentially affected.

6.1.11. In terms of feeding the development, several items are anticipated:

BT: existing duct tracks will be extended to the site boundary whereby the development team will then promote the telecommunications via the installation of new infrastructure.

Electricity: the 33kV system will need to be extended into site where a new Primary substation will be installed. From this, 11kV networks will extend to afford secondary network and ultimately, via the application of local distribution substations, individual connections.

Gas: the medium pressure network will be extended to site where a new PRS will reduce the pressure to low and this then can be utilised to afford individual connections.

The South West Sector

6.1.12. The maximum potential number of dwellings in the southwest sector is estimated to be 2,408, which equates to a population of 5,876.

6.1.13. The estimated utility demand without consideration for any other zones, reflects a load of circa 2,400m3 of gas, 8MVA of electricity and circa 2,900 telephone lines, albeit the figures may be subject to further diversification.

6.1.14. With the exception of BT whom will generally uprate their line capacity without necessarily causing major intrusive works, the electricity and gas networks will require upgrading, some significant.

6.1.15. Taking each in turn, the electricity can accommodate the load on the existing strategic transformers and the incoming circuit capacities should not be breeched.

6.1.16. Gas wise, the immediate available capacity will be exceeded but the first stage of interim works should accommodate the extended load.

6.1.17. Diversion wise, local 11kV electricity systems may be impacted upon and these need to be accommodated within any development proposals. No gas diversions have been identified.

6.1.18. In terms of feeding the development, several items are anticipated:

BT: existing duct tracks will be extended to the site boundary whereby the development team will then promote the telecommunications via the installation of new infrastructure.

Electricity: it is anticipated that the 33kV system would need to be extended from Norton Road to site where a new Primary substation will be installed. From this, 11kV networks will extend to afford secondary network and ultimately, via the application of local distribution substations, individual connections.

Gas: the medium pressure network will be extended to site where a new PRS will reduce the pressure to low and this then can be utilised to afford individual connections.

The North West Sector

6.1.19. The maximum potential number of dwellings in the northwest sector is estimated to be 2,392, which equates to a population of 5,836.

6.1.20. The estimated utility demand without consideration for any other zones, reflects a load of circa 2,400m3 of gas, 8MVA of electricity and circa 2,900 telephone lines, albeit the figures may be subject to further diversification.

6.1.21. With the exception of BT whom will generally uprate their line capacity without necessarily causing major intrusive works, the electricity and gas networks will require upgrading, some significant.

6.1.22. Taking each in turn, the electricity can accommodate the load on the existing strategic transformers and the incoming circuit capacities should not be breeched.

6.1.23. Gas wise, the immediate available capacity will be exceeded but the first stage of interim works should accommodate the extended load.

6.1.24. Diversion wise, the 11kV electricity systems will be impacted upon and this need to be accommodated within any development proposals. No gas diversions have been identified but during the review exercise, an oil pipeline, which is not included within the remit of the appraisal, is potentially affected.

6.1.25. In terms of feeding the development, several items are anticipated:

BT: existing duct tracks will be extended to the site boundary whereby the development team will then promote the telecommunications via the installation of new infrastructure.

Electricity: the 33kV system would need to be extended from Norton Road to site where a new Primary substation will be installed. From this, 11kV networks will extend to afford secondary network and ultimately, via the application of local distribution substations, individual connections.

Gas: the medium pressure network will be extended to site where a new PRS will reduce the pressure to low and this then can be utilised to afford individual connections.

The North East Sector

6.1.26. The maximum potential number of dwellings in the northeast sector is estimated to be 7,256, which equates to a population of 17,705.

6.1.27. The estimated utility demand without consideration for any other zones, reflects a load of 7,300m3 of gas, 24MVA of electricity and circa 8,700 telephone lines, albeit the figures may be subject to further diversification.

6.1.28. With the exception of BT whom will generally uprate their line capacity without necessarily causing major intrusive works, the electricity and gas networks will require significant upgrading.

6.1.29. Taking each in turn, the electricity can accommodate the load on the existing strategic transformers but the incoming circuit capacities will be subject to review as it is likely that the next trigger point will be actioned. This will necessitate a review of the 33kV and the 132kV incoming circuits with a long lead in time should works be deemed necessary. Typically, this could be an interconnection locally to Bugbrooke from Weedon, or more strategically via a new 132kV configuration from Rugby / Coventry. Planning and local objections, particularly if of overhead construction, is likely to restrict delivery.

6.1.30. Gas wise, the immediate available capacity will be exceeded as will the interim stage that can accommodate circa 13,500m3 of gas. This is not necessarily detrimental given that the process can then plan accordingly and be developed into a long-term proposal for Daventry.

6.1.31. Diversion wise, the 11kV, 33kV and 132kV electricity systems will be impacted upon and inherently these need to be accommodated within any development proposals. No gas diversions have been identified but during the review exercise, an oil pipeline which is not included within the remit of the appraisal, is potentially affected.

6.1.32. In terms of feeding the development, several items are anticipated:

BT: existing duct tracks will be extended to the site boundary whereby the development team will then promote the telecommunications via the installation of new infrastructure.

Electricity: the 33kV system will need to be extended into site where a new Primary substation will be installed. From this, 11kV networks will extend to afford secondary network and ultimately, via the application of local distribution substations, individual connections.

Gas: the medium pressure network will be extended to site where a new PRS will reduce the pressure to low and this then can be utilised to afford individual connections.

6.2. Sector Level Specific Infrastructure Provision Constraints

6.2.1. All sectors have the same infrastructure provision constraints, which include the key constraints identified town-wide. Increased growth must match the planning and funding cycle of all utility parties.

6.2.2. The coordination of local planning authorities and developers with the utility companies is a potential constraint given that there are also influencing factors from Regulatory agencies. Generally, Central Networks and National Grid determine capital investment based on their own load projections derived from information sources provided at the local authority level, including Local Development Framework documents. Therefore any new development planned between 2010-2015 should be clearly identified and included during the rolling capital submissions that accompany regulatory reviews.

6.2.3. Although reinforcing existing infrastructure versus having to construct new mains is not necessarily a constraint, the only way to determine which course of action is required is to submit details of a proposed development so that each company can process the request through the network modelling process. (This protocol can constrain high level planning based on its requirement for development detail.)

7 Infrastructure Programme and Cost Estimates

7.1. Introduction

7.1.1. The following section identifies the likely trigger points for major pieces of infrastructure required by Daventry's forthcoming growth to 2021 and 2026.

7.1.2. The trigger points are expressed in terms of population and the number of dwellings. It is important that these figures, and not the years quoted, are recognised as being of prime importance. Nevertheless, the programme does make use of a target population of 40,000 in 2021 in order to count back from this date and suggest a potential date for when the respective infrastructure triggers will be reached. It should be noted that a range of factors, including the availability and delivery of serviced land availability, the prevailing economic conditions, and social trends, including the rate and size of household formation, could either slow or hasten the overall speed of increase in both population and dwelling numbers.

7.1.3. Using the counting back method from 2021, to an estimate population of 25,374 in 2007, calculations estimate the average annual increase in the population is 1,044 people and the average annual increase in the number of dwellings is 453 over the period from 2007 to 2021. The same average annual increases have been assumed up to 2026.

7.1.4. At that rate, there would be approximately 5,220 people and 2,265 dwellings added every five years.

7.1.5. This implies that for the period 2021 – 2026, if the average rate of development were to continue in the ensuing five-year period, the population would reach 45,220 in 2026 and 50,444 in 2031.

7.2. Critical Infrastructure Item Trigger Points

7.2.1. The narrative below summarises the findings of this Technical Report by outlining the estimated utility infrastructure requirements triggered by the expected additional population and dwellings respectively up to around 2026. The population-dwelling trajectory is used to identify the time period over which the demand is likely to come on stream, to indicate a provisional reference point for additional provision.

7.2.2. The utility networks will trigger various operational thresholds throughout the lifecycle of the growth period; however, these will depend upon various facets: not least the rate of domestic build, the rate of associated employment build, the type of employment opportunities derived, as well as the associated infrastructure, such as schools, retail outlets etc, that go with development.

7.2.3. Other influences also come into operation and these include regulatory obligations; as an example, the trigger point determined by Regulatory obligations may be a threshold level somewhat lower than the operational capacity of installed equipment.

7.2.4. Section 6 analysed the implications of future demand for utility infrastructure against the baseline position and identified the following trigger points :

Electricity

- Strategic trigger point: the 100MVA trigger point is anticipated to occur 2016 / 2017 when circa 4,500 to 5,000 residential units are constructed. The timeframes likely to be required to deliver the ongoing capacity is a minimum of 5no. years although this will depend upon the options available at the time of assessment by Central Networks. The timeframes could easily extend to 10no. years, or indeed beyond, if the only option is an overhead line route that requires a public inquiry or similar
- Local trigger point: the ability to add load locally to Daventry BSP is likely to expire circa 2010 / 2011 as this equates to circa 2,000no. residential units are constructed. This trigger point is only noteworthy if the development zones chosen are to the east of town given that for any other area, the requirement will be sooner as there is limited capacity elsewhere. In either circumstance, the ability to deliver a new primary substation is circa 18 months and therefore the earliest timeframe available for delivery would be 2010

Gas

- Trigger point 1: the current available capacity of 500no. equivalent residential units is anticipated to be exhausted in 2008 / 2009. The work associated with the first phase of works will require negotiations with local land owners once the design process has been concluded. Typically, this would incur a minimum of 18 months but it could also prove to be seasonally dependant (i.e. May to September working window)
- Trigger point 2: the phase 1 works completed as part of the upgrades associated with trigger point 1 is anticipated to expire in circa 2012 / 2013, equating to circa 3,000no. residential units (in addition to the 500no. above). Timeframes have not been declared as the timeframe will be dependant upon a scope of works being delivered – as above, the early assessment would reflect a minimum of 18 – 24 months
- Trigger point 3: the phase 1 and 2 works completed as part of the upgrades associated with trigger points 1 and 2 are anticipated to expire in 2022 / 2023 but only if loadings and numbers (say circa 8,000no. residential units) reach predicted levels. As above, the timeframe is wholly dependant upon the scope of works required; the early day consideration is a lead in period of 24 – 30 months would be appropriate but this could also prove to be influenced by seasonally demand and therefore an extra 6 months or so may be incurred

Telecommunications

This was not considered to require significant assessment at this stage.

7.2.5. In all cases, the assessments made reflect the projected build profile identified in the Daventry Land Use Model which includes assumptions on numbers delivered, and based somewhat on a linear approach which, in all likelihood, would not occur.

7.2.6. To calculate the triggers, the computations were based upon existing households at a known time and this was subsequently divided into a known historical load for the same timeframe. This approach therefore includes employment, education, retail and community within the computations to give a residential unit a higher than normal load derivative; the figures, when projected forward, assume that a similar mix of social infrastructure is required ongoing (i.e. developments will trigger employment, education etc).

7.2.7. Based on the identified benchmark values, the figures are then projected forward annually utilising the agreed build rate to establish ongoing thresholds. Added to this mix is an element of organic growth which is determined as being nominal increases that naturally occur – typically, this could be infill housing, aspirational influences (for example, the wider population installing televisions in bedrooms as opposed to a single unit in the lounge) and / or commercial changes (businesses upgrading equipment does not necessarily mean less energy demand).

7.2.8. The approach does mean that the assessment is effectively 'blind' to load type and therefore the threshold, once reached, will trigger the next level of investment regardless of whether it is residential or, for example, commercial demand.

7.2.9. With respect to the likely time period for provision the following issues should also be considered:

- Scheme Planning: in the context of each utility company, scheme design, capital expenditure authorisation and delivery can be substantial. This is particularly pertinent to higher pressures – high pressure gas and extra high voltage electricity for example. Generally, this is due to system assessment and configuration; notwithstanding this, delivery may present itself to a very defined window of opportunity
- Planning: in the context of a scheme, it is possible that the works required could involve significant infrastructure that is met with opposition. For example, a new overhead line, with pylons, would most likely incur significant opposition and a possible 'Public Inquiry' that could extend delivery beyond that desired. /a lower voltage 33kV overhead line, whilst established on wood poles for example, would then require landowner consent and this often is protracted as there is an effective 'ransom'
- Timing: most utility network operators will seek financial contribution wherever possible, albeit recognising the Regulatory pressures that determine applied rules. In addition, the network planning will reflect defined schemes whereby, at this strategic level, growth plans may be acknowledged but not triggered until development schemes progress

Table 7-1: Daventry Infrastructure Requirements Programme and Estimated Cost to 2021- The trigger is indicated in bold

Additional Population in Daventry	Additional Number of Dwellings in Daventry	Infrastructure Item Requirement	Likely Year / Time Period	Estimated Cost
25,379	**10,192**	**[Base population point]**	**2007**	
+1,153	**+500 (Trigger)**	**Gas:** Phase 1 works to secure gas supply beyond 500 additional dwellings.	2008	£3M+
4,615	**+2,000 (Trigger)**	**Electricity:** New primary substation (Bulk Supply Point)	2011	£2M[14]
+8,075	**+3,500 (Trigger)**	**Gas:** Phase 2 works to secure gas supply beyond an additional 3,000 dwellings.	2014	NA
+10,384	**+4,500 (Trigger)**	**Electricity:** Strategic Trigger Point (100MVA) expected to be reached with c. 4,500 – 5,000 new homes. Options: (i) Transfer DIRFT Primary substation load to Rugby (ii) Bugbrooke to Weedon connection (iii) New 132kV feed from Coventry	2017	Cost per option[15] (i) £1M (ii) £3M (iii) £10M+

Source: URS, ISU Ltd, NCC and HA.

Table 7-2: Daventry Infrastructure Requirements Programme and Estimated Cost, 2021-2026 - The trigger is indicated in bold

Additional Population in Daventry	Additional Dwelling Number in Daventry	Infrastructure Item Requirement	Likely Year / Time Period	Estimated Cost
+19,612	**+8,000 (Trigger)**	**Gas**: Phase 3 works to secure gas supply beyond 8,000 additional dwellings	2024	NA
		Electricity: Strategic transformer capacity at Daventry BSP likely to be exceeded. The options would be to install upgrade the transformers and the circuits, install a complete new BSP (significant) or secure the ability to transfer load to another BSP	Beyond 2021	NA

Source: URS, ISU Ltd, NCC and HA.

14 It is assumed that new development utilises firstly spare capacity located at Norton Road and is based upon c.2000no. residential units (if the load is located away from this, this trigger point may be actioned earlier). It also assumes that the connection point for the 33kV cabling is relatively close. Costs are identified from previous project experience and information secured from the utility company. Figure are based on 2007 benchmark.

15 The trigger is based upon 2,500no. residential units in addition to the 2,000no. units identified previously. This is a strategic asset requirement and therefore is blind as to where the location actually occurs. Costs identified are based upon previous project experience, information secured from the utility company and are meant to provide an order of magnitude only. All figures based upon 2007 values.

7.3. Cost Estimates for Major Infrastructure Requirements

7.3.1. Costs associated with the increase in expected additional population and dwellings respectively up to 2026 are based upon a 2007 benchmark albeit they have not been secured via formal pricing mechanisms.

7.3.2. All cost estimates cover capital costs only and exclude land, operational and maintenance costs.

7.3.3. The costs, whilst influenced by similar projects and assessed by the author for pertinence, are indicative only; however, they do appropriately demonstrate the order of magnitude that may be faced given that many facets will be influenced. Typically, available routes, land owners, world metal market prices (copper for example being very high currently), technical integration and other development zones could all determine pressures on cost and indeed delivery.

7.3.4. To clarify the costing exercise, recent pricing (2007) with Central Networks for a project in Northampton identified a Primary substation cost, assuming up to 500m of 33kV cabling, generated a cost of circa £2M. An upgrade scheme in South Northamptonshire identified a total scheme cost of c. £5.1M for a new Primary substation and c.13km of 33kV cabling (2008). It is also recognised that copper prices have increased.

7.3.5. With regard to 132kV works, a 2km diversion in Milton Keynes, in 2007, identified a total scheme cost of c. £7M, albeit this reflected a double circuit overhead line.

7.3.6. The majority of the works identified, under current Regulatory rulings, do not permit third parties given that the Assets are owned and operated by the host provider. In saying that, elements could well be subject to competition and these would normally generate benefit to the Developer.

7.3.7. Notwithstanding the potential delivery benefits, both the electricity and gas assets are of financial value and this is often reflected in either minimal cost scheme (450no. unit residential development in Milton Keynes delivered free gas infrastructure to the Developer plus a 'rebate' for each connection made).

7.3.8. As such, the costings are deemed to be whole cost schemes (i.e. true cost without offset asset value) and therefore reflective of the magnitude.

Table 7-3: Estimated Costs of Major Utility Infrastructure

Infrastructure	Approximate Cost (£ million)[17]	Proportion attributable to Daventry[16]
Electricity – strategic support	£5M+ (33kV)	100%
	£10M+ (132kV)	100%
Electricity – major dev. costs	£2M+	100%
Electricity – 132kV diversion	£5M	100%
Electricity – 33kV diversion / cct	£1.5M	100%
Gas – phase 1 works	£3M	100%

16 This column refers to the proportion of infrastructure requirement which is attributable to the anticipated growth of Daventry; it is not intended to signify financial contribution by any one party.

17 Costs identified have been derived from background research with individual utility companies, previous / similar projects and the authors experience as an independent Utility Consultant. They are meant to demonstrate magnitude with actual cost being derived and wholly dependant upon many facets, typically including development layouts, timeframes and 'real time' network characteristics. The system trigger points for each utility will only be derived from 'actual' applications for network connections and whilst those identified are anticipated, many influences will determine the outcome.

8 Sustainable Development Scenario Assessment

8.1. Introduction

8.1.1. The following chapter describes the opportunities and constraints affecting the provision of utilities infrastructure, before setting out the implications of this analysis for growth in terms of a sustainable development scenario for Daventry.

8.2. Review of Opportunities and Constraints

Electricity

8.2.1. With respect to the constraints inherent in the electricity network, Figures U2 and U3 broadly identify the location of overhead electrical lines. These are not meant to be exclusive but they do represent the more significant influences of the electricity distribution system – whether this be cost and / or technical.

8.2.2. In pure engineering terms however, no significant issues arise that, when considering each item of apparatus, preclude the diversion of or, indeed, the working with.

8.2.3. Capacity wise, Central Networks, the owner and operator of the electricity network in Daventry, have one major intake point in the town and this is located in the vicinity of Norton Road (cross refer to Figure U4). There is a second relatively strategic point positioned to the west of the town which is located in the vicinity of Braunston Road – this latter site is predicted to be a full capacity within the next 12 months or so, on the basis of existing levels of organic growth.

8.2.4. With respect to the opportunities for providing electricity for future growth, the best opportunities for the supply of electricity to new development – given the existing infrastructure networks – lie to the east of Daventry. This is due to the fact that there is potential spare capacity in the vicinity of Norton Road. Once this has been fully utilised, a new primary substation (33kV / 11kV transformation point) will most likely be required within the confines of the development zone (there is a possibility that more than one may be required but this will depend upon the layout of development). All designs and system availability would be subject to formal assessment by Energy Services, the Central Networks delivery arm, or an independent network operator.

8.2.5. Considering the overall principles for sustainable infrastructure, the most prudent use of natural resources is to limit the works required to deliver the growth plans. There is a subsequent conflict however between the two sectors to the east given that one, the north east, would be the better option for capacity but it contains the greater number of significant constraints.

8.2.6. The consideration therefore is whether the constraints can be managed to an extent whereby the additional infrastructure works required to furnish the south east sector are more significant than that of diverting and / or managing existing apparatus. Our assessment of this issue is that, while there is a cost involved in overcoming or relocating the constraining pieces of infrastructure, there are wider benefits to be gained (including the reduction of EMFs and aesthetic improvements to the landscape) that arguably cancel out the costs involved and make the North East sector of Daventry a sustainable development location.

8.2.7. **Figure U6 (Appendix B)** summarises the above issues in relation to electrical infrastructure and supply in order to further clarify the opportunities and / or constraints discussed above.

Gas

8.2.8. Figure U1 identifies the route of the intermediate pressure gas main supplying Daventry with gas. The gas main runs from a Pressure Reducing Station at Long Buckby, which reduces the pressure from a high to intermediate level fit for transport to Daventry. At the other end, the main connects into another pressure reducing station at Daventry. At this point, the system is reduced in pressure to medium and transported around the town via a ring main.

8.2.9. Having regard to the constraints affecting or affected by the provision of gas infrastructure, Figure U1 identifies the gas-related infrastructure issues that require consideration in order to identify the issues that will impact upon the sustainable development scenario. This is not meant to be exclusive but it does represent the more significant influences of the gas distribution system – whether this be cost and / or technical considerations.

8.2.10. In terms of pure engineering however, no significant aspects have been raised that, when considering each item of apparatus, preclude the diversion of or, indeed, the working with.

8.2.11. Capacity wise, National Grid, the owner and operator of the network in Daventry, have one major intake point in the town and this is located to the north adjacent to the Grand Union Canal and Welton Road (cross refer to Figure U1).

8.2.12. Having regard to the opportunities provided by the existing gas infrastructure network, and for the expansion of this network for Daventry's future growth, there was no particular area or sector of the town that was favoured. However, there is an argument to be made that the closer development is to the intake point, the more that there may be opportunity limit any upgrading works on the existing apparatus.

8.2.13. Immediate availability of capacity is extremely limited, as there is presently the equivalent of circa 500no. residential units that can be connected without significant reinforcement (this is likely to be naturally 'consumed' within 2008-2009). Beyond this, upgrading of the network will be required and this will incur both time and cost. The latter item may not be wholly applicable to the development but would be subject to an economic test derived via Regulator agreed principles.

8.2.14. Considering the general guideline principles for infrastructure, the most prudent use of natural resources is to limit the works required to deliver the growth plans. Having regard to what this means for development, this situation inherently – albeit arguably – favours sites to the east of Daventry, and to some degree sites proximate to the intake point north-east of the town.

8.2.15. Figure U6 summarises the above issues in relation to gas infrastructure and supply in order to further clarify the opportunities and / or constraints discussed above.

Telecommunications

8.2.16. Constraints wise, no major issues have been identified. It is known that the main east west routes (Northampton – Coventry – Birmingham) for telecommunications infrastructure are located along the historical trunk road system that is along the former route of the A45. There are also other elements of the telecommunications infrastructure network located along Norton Road.

8.2.17. At the time of writing, all mains can be considered capable of being relocated subject to appropriate liaison with BT. This would also apply to second generation operators, for example, Virgin Media or Kingston Communications.

8.2.18. Capacity wise, the ability to afford suitable telecommunication services as the town grows is considered to be reasonably available and can be achieved with limited impact upon the town, in terms of any physical or major intrusive disturbance.

8.2.19. Figure U6 summarises the above issues in relation to telecommunications in order to further clarify the opportunities and / or constraints discussed above.

8.3. Principles for Sustainable Infrastructure Provision

8.3.1. To help inform the assessment of the constraints and opportunities for the provision of utilities infrastructure, it is useful to re-consider the basic principles for utilities infrastructure provision.

8.3.2. Therefore, in summary, the principles for the sustainable provision of utilities infrastructure to supply electricity, gas and telecommunications to meet the growth needs of Daventry are considered to be:

- Prudent use of natural resources
- Minimising excessive cost
- Minimising undue environmental or stakeholder disturbance
- Various technical considerations

8.4. Utilities - Implications for Sustainable Infrastructure

8.4.1. Figure U7 shows the areas of opportunity for Daventry's future growth having regard to the opportunities and constraints presented by the existing provision of electrical, gas and telecommunications infrastructure.

8.4.2. Overall, having regard to these considerations, the east side of Daventry (comprised of the north-east and south-east sectors) appear to offer the best opportunities for growth for the town. The reasons for this, and the reasons why the west side presents less opportunity, are discussed in relation to each of the sectors below:

North East Sector

8.4.3. This sector is ideally placed to accommodate the growth of Daventry given that the current incoming town intakes for gas and electricity, in particular, are located in proximity to, and within, this area. This means that capacity is more readily available, albeit that works, some significant, will still be required to afford supplies.

8.4.4. The major benefits, in terms of capacity, are that the connectivity is achievable without the need to greatly affect the town and the incumbent stakeholders.

8.4.5. The major disadvantage of this area is the current volume of strategic utility apparatus that crosses it. There are several facets to consider, over and above the capacity issues however:

- the cost of the works to clear the site
- whether the relocation of the constraints will arise as a consequences of development
- the delivery of the site for development
- the demand for resources and impact on the local natural environment for the provision of resources, as the construction of trenches requires various resources, including stone / sand / tarmac / copper / oil for plastic etc. Effectively, the demand placed on such resources will be reduced where it is possible to reduce the length and extent of any trench system.
- the impact on local stakeholders (stakeholders can include: residents, businesses, Local Authorities, community groups or their representatives, English Heritage, land owners, developers, etc).

8.4.6. However, if development were to proceed in this area, then there would be benefits that would accrue to the town, as it would provide the opportunity for unsightly apparatus to be relocated, with the costs being borne by the developer. Additionally, in some instances, without the diversion / removal the constraints traversing the areas, this land would not otherwise be available for development.

8.4.7. If it were not for the above mentioned disadvantages / constraints present within the north east sector, the sector would be the clear front runner in terms of the sustainable development scenario for growth when having regard to utilities infrastructure and related considerations. As it is, the sector draws roughly even with the south east sector, which is discussed next.

South East Sector

8.4.8. This south east area, in terms of utilities, is also well placed to accommodate growth and this is based on the fact that the capacity (in terms of energy) is reasonably available; furthermore constraints are at present more limited in number and extent than those in the north east quadrant.

8.4.9. In addition to the fact that the constraints within the area are fairly limited there is also the consideration that, strategically, there is potentially a good fit in terms of interconnectivity with West Northamptonshire overall if it is the case that a link with Northampton is required to secure supplies for either electricity and / or gas.

South West Sector

8.4.10. The south west sector presents a reasonable option for growth based on the fact that there is a lack of constraints in respect of utilities infrastructure, and that there is also, to a degree, sufficient capacity.

8.4.11. The downside with this area is that any strategic connection would potentially affect a greater number of stakeholders. For example, given that the starting point for connecting and supplying the area with electricity would be to the north of the town, this would arguably incur a higher degree of landscape and stakeholder disturbance in terms of requiring works to insert the necessary infrastructure. This in turn would be likely to be a more resource intensive location for providing utilities, and would have the potential to impact negatively on local residents and landowners and also on the natural environment.

North West Sector

8.4.12. As with the south west sector, the north west sector is also a reasonable option due to the lack of any major constraints. However, capacity within the infrastructure network is not readily available locally. On this basis, growth within this area would require works to be undertaken that would, in all likelihood, incur a higher cost and result in a higher level of environmental disturbance than growth or development in other areas.

8.5. Conclusions

Electricity

8.5.1. Despite the fact that there are major constraints that are pertinent to both capacity and / or existing apparatus – the ideal development zone is to the east of the town. If there were no constraints, the most sustainable development scenario for Daventry's growth would be for development to take place to the north east of the town. Accepting that these constraints can be relocated, the question is whether the impact is greater on doing so or whether the extended infrastructure would cause least issue.

8.5.2. Currently, taking all things into consideration, the north east and south east sectors appear to equally afford opportunities for the most sustainable development scenario.

Gas

8.5.3. There is limited capacity available on the existing gas network and therefore significant works are anticipated. In saying that, the town network is reported to be sound and therefore, with no major constraints identified, all sectors present themselves reasonably well with a bias towards the main intake position on Welton Road (close to the Canal crossing) to the north east of the town.

8.5.4. Taking all things into consideration, the most sustainable scenario for growth in terms of sustainable gas infrastructure is provided by the north east sector of Daventry.

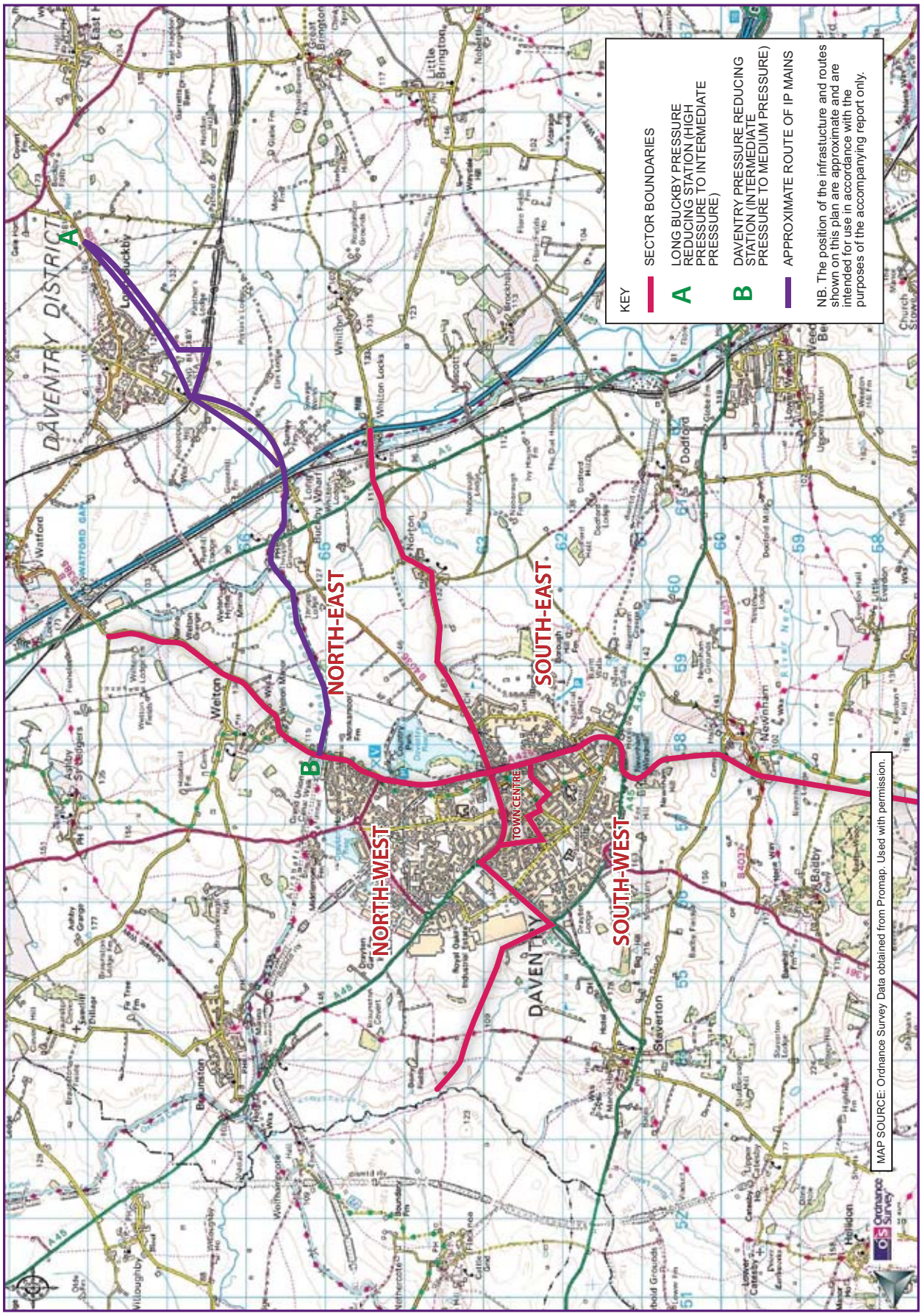
Telecommunications

8.5.5. No major issues are generally identified with the existing network configuration, albeit new junctions may require elements of diversion works.

8.5.6. Capacity wise, no major issues are anticipated and therefore all sectors present themselves reasonably well – arguably, there is benefit to development sectors closer to the more significant mains that enter / exit the town (along the former route of the A45) as connecting these sites to the existing telecommunications network is likely to be the least resource intensive option, and is also likely to incur the lowest level of environmental disturbance.

Appendix A

U1 - Existing Gas Infrastructure



U2 - Existing Electrical Infrastructure -132kV Transmission Line

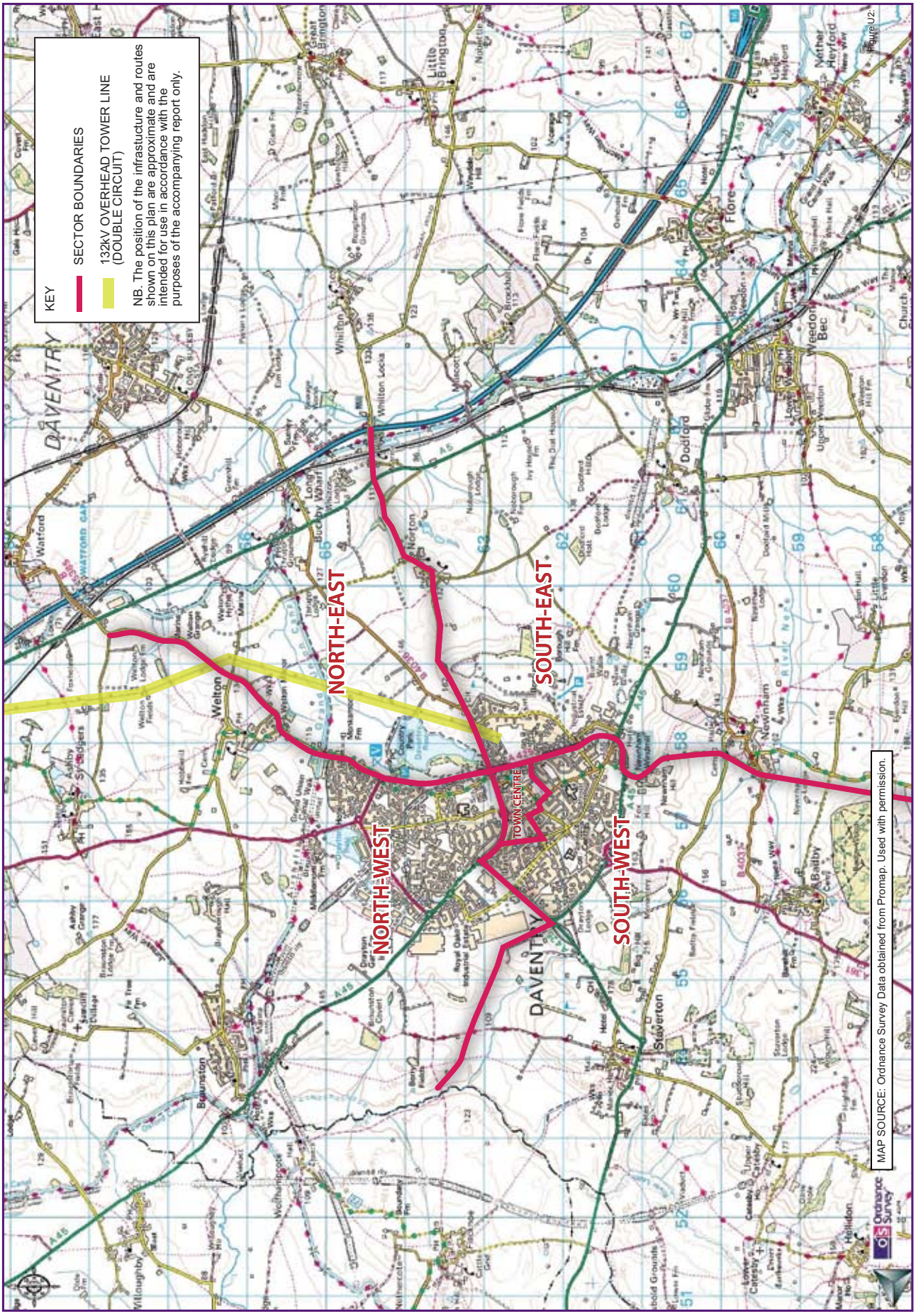
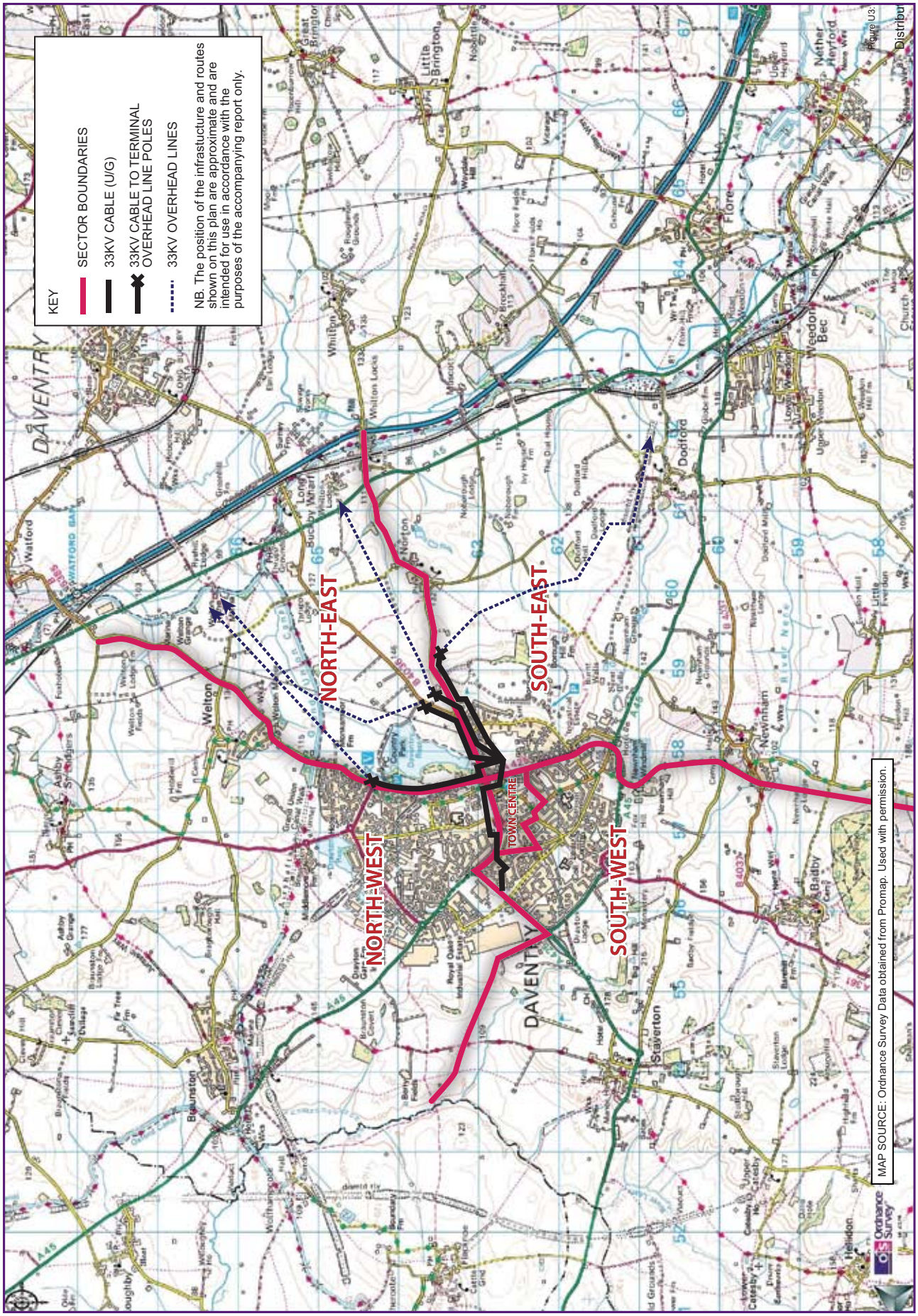


Figure U2:

U3 - Existing Electrical Infrastructure 33kV Distribution



U4 - Existing Electrical Infrastructure - Bulk Supply Points

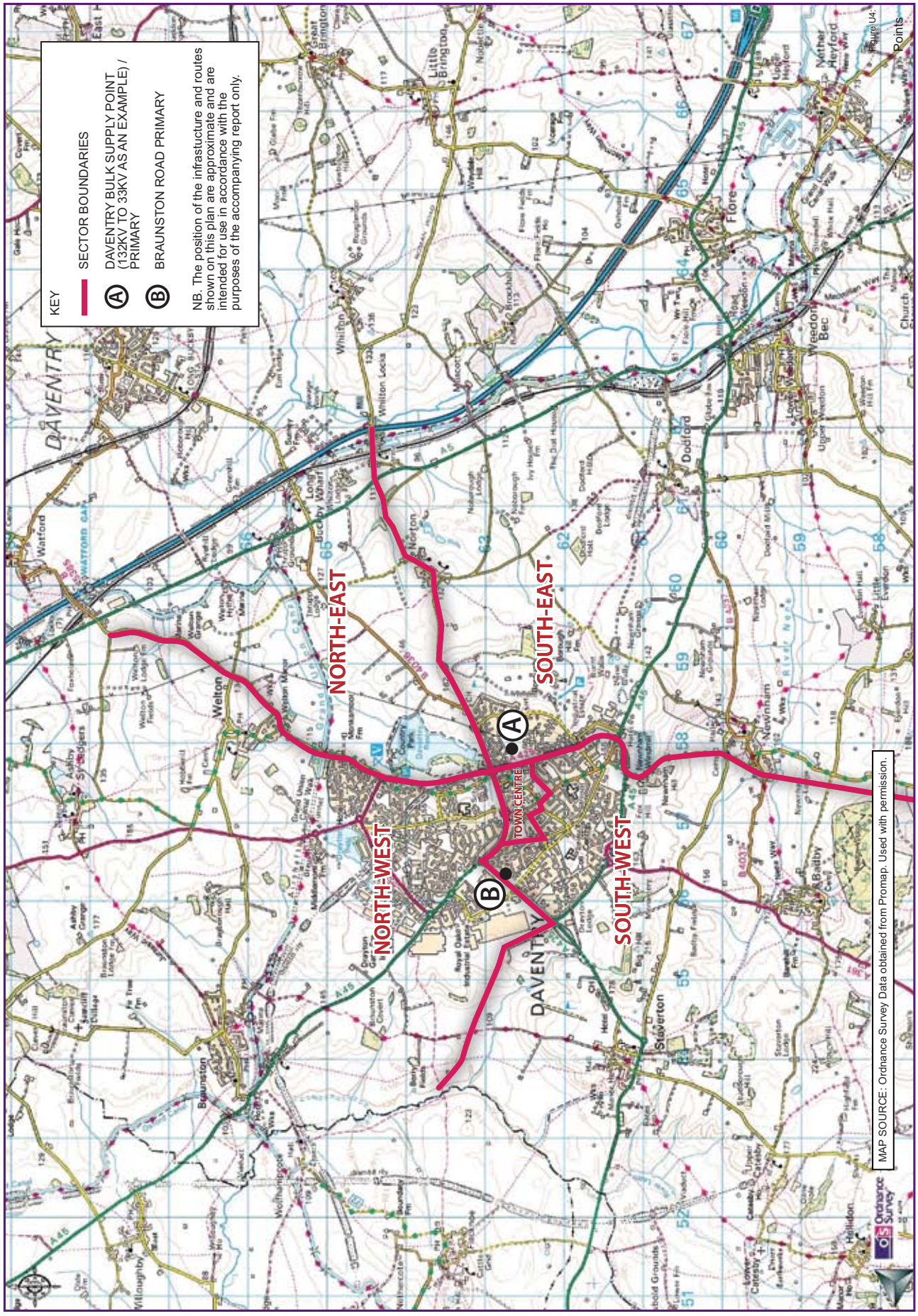
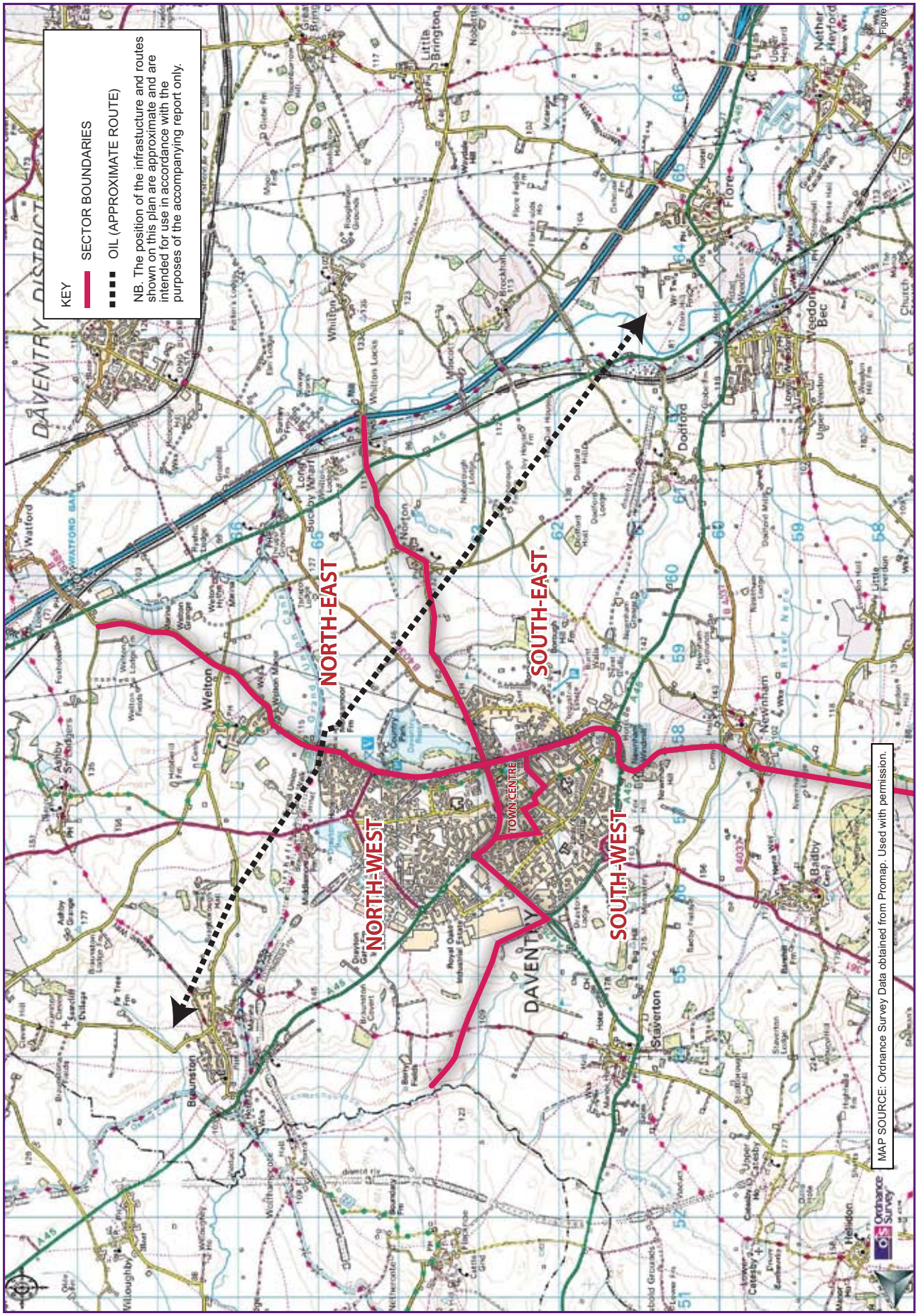


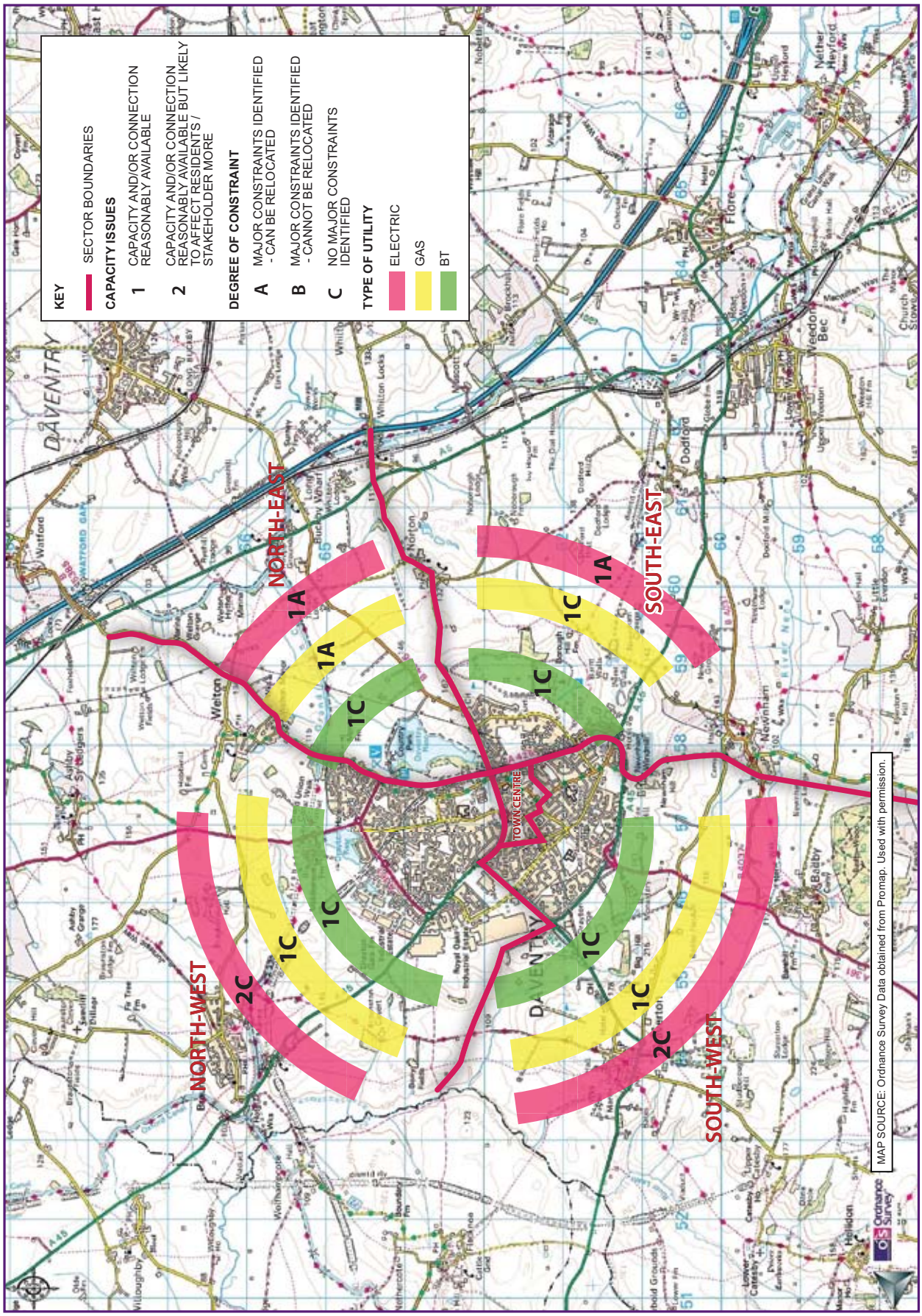
Figure U4: Points

U5 - Existing Oil Pipeline

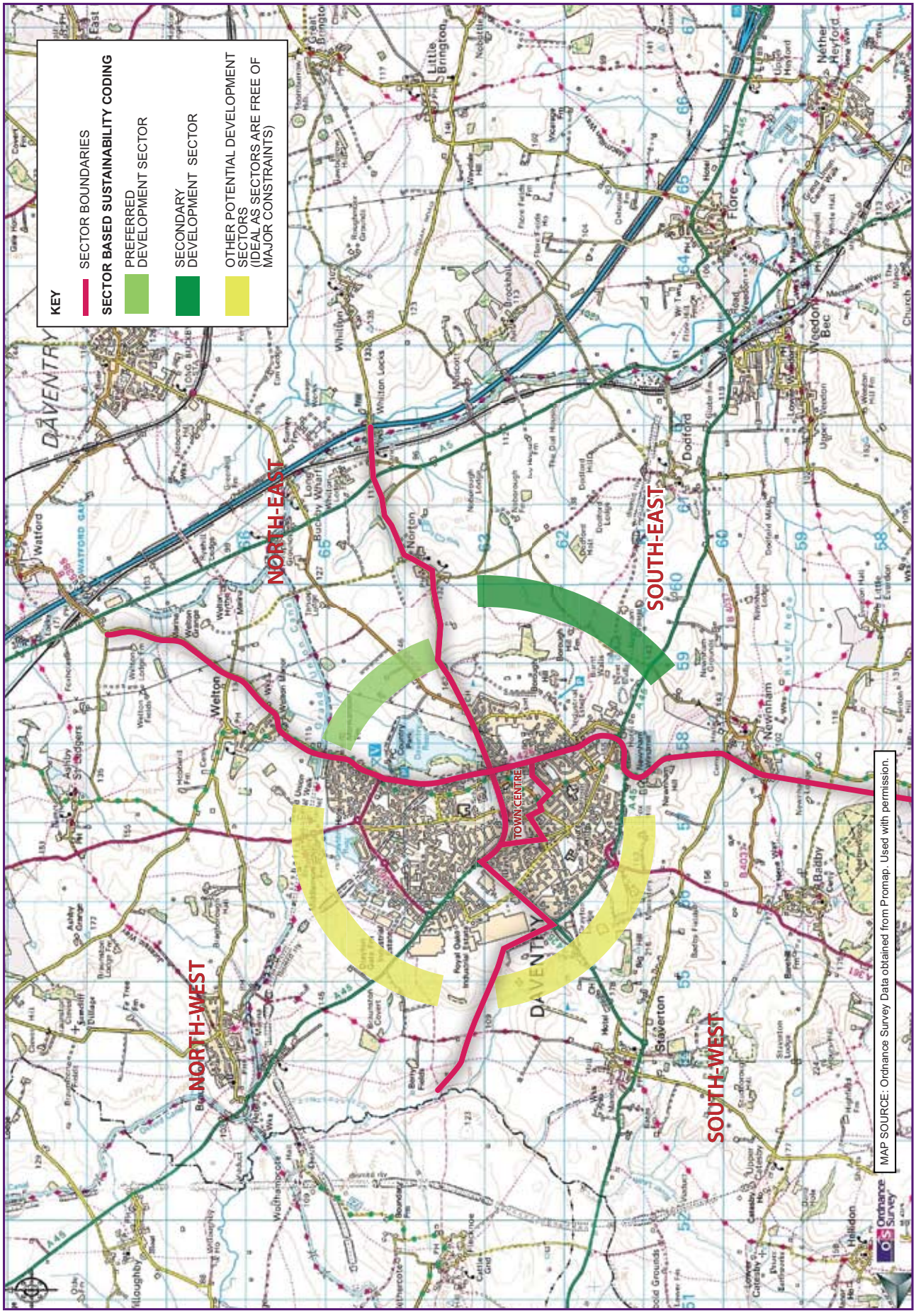


Appendix B

U6 - Utilities Constraints Plan



U7 - Optimal Development Sectors - Utilities Infrastructure



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