

WYG Engineering

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Sheffield Energy and Water Infrastructure Study

Part I: Executive Summary



Creativesheffield.



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1 Executive Summary

1.1 Study Brief, Structure and Method

This study was conceived by Creative Sheffield (Sheffield's City Development Company) and Sheffield City Council following the publication of the Sheffield Economic Masterplan in January 2007. This Economic Masterplan included a theme for "Creating the Conditions for Sustainable Growth", which noted under Programme 3.1 that the major environmental challenges of economic growth include providing the energy infrastructure for growing business and resident populations, ensuring a sustainable water supply, improving energy efficiency and changing resident and business behaviours. Creative Sheffield secured funding from Yorkshire Forward and managed the delivery of the study, which commenced in December 2008.

The study relates to the first two points of Programme 3.1 within the Economic Masterplan and aims to identify the utilities constraints and investment requirements which might ultimately constrain economic growth and sustainable development within the City Centre. This study was extended to capture the utilities constraints of the wider City Council area in order to provide evidence to support the emerging Sheffield Development Framework and any City Council led Community Infrastructure Levy should this be progressed. The study was further extended by Sheffield City Council to capture additional evidence to support emerging environmental policy within the City; the core utility outputs are described in Table 1.

The Sheffield Energy and Water Infrastructure Study is issued in four parts; Part I is this Executive Summary, Part II is a comprehensive response to the Project Brief, Part III contains comprehensive datasheets for the 319 individual development sites provided by Sheffield City Council's Forward planning Team and the fourth element is a comprehensive GIS database.

The GIS database illustrates the location of all strategic utilities services within Sheffield and immediately adjoining the City, including all development sites, development clusters and community assembly areas. This database also captures large thermal energy users. This database was a key tool in the development of this study – especially Part III of this study (comprehensive datasheets for 319 individual development sites) - and has recently been issued to Sheffield City Council's Forward Planning Department. The database is controlled to a limited number of users due to commercial confidentiality and to avoid the potential for unintended use.



SHEFFIELD ENERGY & WATER INFRASTRUCTURE STUDY CORE OUTPUTS	
1	A quantitative assessment of the water, wastewater and energy load growth to 2026 based on 319 anticipated new developments across the Metropolitan Authority. This activity will also include an assessment of increased CO ₂ emissions based on existing and anticipated changes to national, regional and local energy policy. The 319 sites were chosen by Sheffield City Council's Forward Planning Team in order to obtain evidence in support of the emerging 'City Policies and Sites' document to be adopted in 2012
2	A consultation with the incumbent water, wastewater, electricity and gas undertakers on a Site-wide, Community Assembly-wide and City-wide basis to understand; <ul style="list-style-type: none"> • A summary of City-wide utility infrastructure investment need to 2026 • Planned utility capital investment programmes for Sheffield and • Utility investment need shortfalls to be funded by the developer supply-chain
3	Details of the regulatory frameworks for apportioning capital expenditure requirements for new utilities investment (capital apportionment between utility undertakers and the developer supply-chain)
4	Options for securing better financial value and a more transparent forward investment programme to the benefit of all stakeholders (rather than reacting to individual developer led applications that trigger disproportionate investment needs and programme risk)
5	Comprehensive datasheets for 319 development sites identifying abnormal off-site and remote infrastructure needs and associated capital costs
6	Comprehensive datasheets for 319 development sites identifying physical constraints associated with existing trunk services, including the size of trunk services, budget costs for diversionary activities, or alternatively the residual risks (and Rights of Access) associated with leaving these services in-situ
7	Methods for protecting the Public Realm (including public highway) from repeat excavation and reinstatement by the various utility undertakers
8	Investment opportunities for establishing connections to new and existing Low to Zero-Carbon (LZC) and renewable energy facilities: Sites that might be connected to the existing Energy Recovery Facility and the anticipated Biomass Powerstation and also locations where clusters of large energy users – existing and planned – could potentially generate sufficient revenue to attract new private-sector investors
9	An overview of those research and development activities currently being undertaken within the two universities in Sheffield that relate to sustainable energy technologies to identify areas for economic growth in the green technology sector
10	A GIS database containing strategic water, wastewater, energy and telecommunications infrastructure within the City plus spatial representations of the City Centre Masterplan Areas and the 319 development sites

TABLE 1.1 – Energy and Water Study Primary Outputs

The quantitative and qualitative analysis and outputs from this study are largely based on data provided by Sheffield City Council's Forward Planning Department in February and March 2009. Figure 1.1 identifies the anticipated residential and non residential growth from the 319 potential



development sites provisionally ear-marked by Sheffield City Council’s Forward Planning Team, which forms the baseline study data and was the basis of the consultation with the utility undertakers. The timelines are derived from approximate data provided by Sheffield City Council Forward Planning, Sheffield City Council City Development Team and Creative Sheffield. These timelines are estimated and may be affected by general economic conditions.

Potential levels of new development based on provisional SDF site allocations

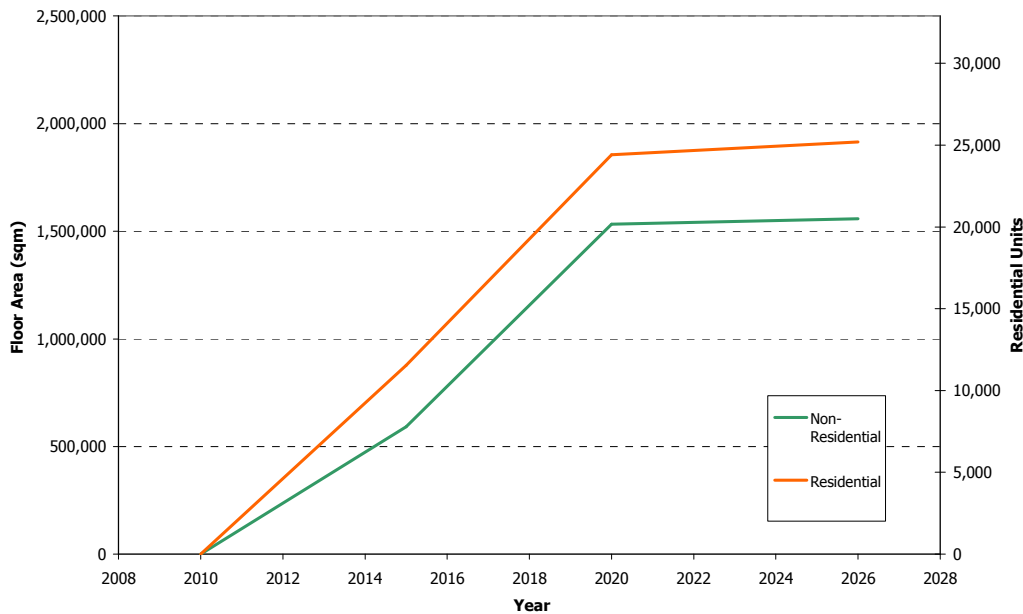


FIGURE 1.1 – Potential quantum of new development within the City

1.2 Headline Results

- The provision of energy and water infrastructure in Sheffield is generally very good with relatively modest infrastructure investment needed to deliver the City Centre Masterplan and the wider Sheffield Development Framework.
- Existing water, sewerage, gas and telecommunications infrastructure will meet the needs of the Sheffield Development Framework without abnormal developer or public sector investment.
- Investment in sewage treatment capacity is required to meet stated population and employment growth in a number of areas outside the City Centre. This investment will be wholly funded by Yorkshire Water Services (where development allocations are within the adopted SDF) but some



investment may not be delivered until the latter part of their 2015-2020 asset planning period.

- Investment in electricity distribution networks is required to deliver the City Centre Masterplan; as the sequence of City Centre development will be market led it is likely that some development will trigger abnormal developer investment and therefore alternative methods of funding might be required to remove constraints upon development.
- Planned investment by Digital Region Ltd across the whole city is extensive; this should provide a market-leading platform on which to build economic development. The programme and detailed design have not been provided by Thales at this time. The mechanism for funding network extensions on new development sites has not been derived by Digital Region Ltd at this time and should be considered (although fibre to the premises should not be required in most circumstances) and therefore extreme downstream connections might be delivered through traditional copper cables.
- Significant investment in District Energy is recommended to allow new development in the City Centre to be compliant with national and emerging supplementary local planning policy in the most economic manner. This should also ensure that existing district energy assets are strategically developed and/or to provide some competition in this marketplace.
- Veolia (ES) Sheffield has stated that they invest in network extensions and new connections (based on the value of the estimated future revenue stream) however this new connections funding process is not fully transparent and should be clarified further.
- Carbon emissions are reduced significantly through anticipated step-changes in building regulations and less significantly through the introduction of policy CS65 and therefore the economic development cost of this additional policy should be fully considered.

1.3 Summary of Findings

1.3.1 Water, Wastewater, Energy and Telecommunications Infrastructure – General

The baseline provision of infrastructure in Sheffield is very good; there are no genuine constraints to economic growth in the City Centre or population growth in the wider Metropolitan Area.



The relatively modest caveats to this general statement is the need to consider alternative methods of funding in order to reduce the burden upon development within the City Centre in regard to electricity procurement, and again in the wider City should development be required where there is currently an issue with lack of sewage treatment capacity (the Sewage Treatment capacity issues could trigger planning objections from the incumbent sewerage undertaker).

1.3.2 Water

Yorkshire Water Services and Severn Trent Water have both confirmed that there are no strategic shortfalls in water abstraction, water treatment or water distribution which currently affect Sheffield or would affect the delivery of the Sheffield Development Framework to 2026.

1.3.3 Sewerage and Sewage Treatment (Wastewater)

There are no significant issues associated with the trunk sewer network and other strategic sewerage assets in Sheffield and therefore development in the City Centre and the wider Metropolitan Area should not be constrained within the period to 2026. It must be noted that this statement is based on the assumption that increased surface water flows (and any groundwater flows) from new development will be discharged via separate sustainable drainage networks in accordance with current SUDS best practise.

The current provision of wastewater treatment (sewage treatment) capacity will constrain some development outside the City Centre. Yorkshire Water Services has investment plans within AMP5 (2010 to 2015) to mitigate this issue but this capital programme only includes those sites captured at the time of the 2009 periodic review, i.e. sites contained within the 'City Sites Preferred Options Document' or those committed by December 2008. On adoption of the Sheffield Development Framework (SDF) Yorkshire Water Services will be able to programme any additional investment works but this will be between 2015 and 2020 (AMP6). The following development clusters are served by sewage treatment works with limited treatment capacity.



New Development Cluster	Comments
East Stocksbridge	Insufficient Capacity at Stocksbridge Sewage Treatment Works
Handsworth and Woodhouse	Risk of insufficient Sewage Treatment Capacity at Blackburn Meadows Sewage Treatment Works
Gleadless Valley	Risk of insufficient Sewage Treatment Capacity at Blackburn Meadows Sewage Treatment Works
Beighton and Mosborough	Risk of insufficient Sewage Treatment Capacity at Woodhouse Mill Sewage Treatment Works
Hackenthorpe Cluster	Risk of insufficient Sewage Treatment Capacity at Woodhouse Mill Sewage Treatment Works

TABLE 1.2 – Development Clusters where Sewage Treatment Capacity is limited or at Risk

Unfortunately Waverley, which is officially located outside of the Sheffield Metropolitan Authority boundary, cannot be drained into the existing foul sewerage network and further there is not capacity at the Sewage Treatment Works to accommodate its foul flows. Currently Rotherham Council is in dialogue with Yorkshire Water Services and a possible solution has now been tabled.

1.3.4 Surface Water (Stormwater) Drainage

Surface water from new development must be discharged in accordance with the widely recognised sustainable drainage (SUDS) hierarchy – and not into existing piped sewer networks unless as a last resort. In this instance Yorkshire Water Services has advised that surface water discharge from brownfield sites should be limited to their former discharge rate. The Environment Agency will likely take a more stringent view and would wish to limit surface water discharge from brownfield sites to at least 30% below former discharge rates. This will involve more substantial onsite stormwater attenuation and likely increase development costs but this is not considered an abnormal investment need in the context of this study. Investment in SUDS assets and the issue of ownership and operation of these assets is outside the scope of this study.

1.3.5 Gas

National Grid Gas (UK Distribution) has confirmed that there is no strategic gas shortfall currently affecting Sheffield or which would affect the development of the Sheffield Development Framework to 2026. The intermediate-pressure (IP) gas network which forms a ring-main around central Sheffield is securely supported from the national and regional high-pressure (HP) network. This IP network supports a medium-pressure and low-pressure network across the City.

National Grid has committed to a strategic investment programme which will improve security of supply to Northern Sheffield; this project (known as the Barnsley Network Reinforcement Programme) will be delivered in 2011 and 2012.



1.3.6 Electricity

There is no significant risk to population or economic growth within the City of Sheffield due to the strategic 400kV, 275kV or 132kV regional and national electricity transmission networks supporting the City – in this regard Sheffield is very adequately served.

There is currently network capacity or security of supply issues on the 33kV network local to Ellin Street, Claywheels Lane, Wheatacre Road, Dronfield and Stanley Street 33kV Primary Substations. These Primary Substations predominantly support parts of Sheffield City Centre and therefore the delivery programme for the City Centre Masterplan should be considered carefully in order to keep development costs to a minimum.

Development in the Dronfield Primary Substation catchment is considered very small therefore this substation may not be a significant development constraint.

The Wheatacre Road Primary Substation provides security of supply to existing customers only because of a connection to a privately owned Primary Substation (in a steelworks site) therefore an additional investment need may be required through the actions of a third party; YEDL are monitoring this situation but there is a risk that development costs/programmes may be affected.

YEDL have confirmed that transformer replacement at Claywheels Lane Primary Substation is to be carried out in 2011 as part of their asset replacement programme. This asset replacement will create a further 6MVA of firm capacity at the Primary Substation, and therefore development costs are unlikely to increase unless development is required before 2011.

Development local to Stanley Street Primary Substation may trigger new transformer upgrades (circa £3,000,000 not including land) in order to create a further 6MVA of firm capacity at the Primary Substation. The following sites are affected:



Primary Substation Reinforcement	Site No.	Site Name
Stanley Street – Transformer replacement (developer attributable cost)	P00013	Hartwell's site, Savile Street
	P00021	Somerset Road
	P00040	Blonk Street, adj. 28 Wicker
	P00110	Spitalfields/ Brunswick Road
	P00114	Stanley Street / Stanley Lane
	P00121	West Bar Triangle
	P00151	Effingham Street Gasworks, Sussex Street

TABLE 1.3 – Stanley Street Primary Substation

There is supply capacity issue at Ellin Street Primary Substation where a contemporary developer application for the New Retail Quarter cannot be supported without major investment at this primary asset. YEDL are already in discussions regarding a new Primary Substation adjacent to the existing Ellin Street Primary Substation. The cost of this Primary Substation would be developer funded, and the following developments will likely be required to pay an apportioned cost of the estimated £4,000,000 of the new Primary Substation.

Primary Substation Reinforcement	Site No.	Site Name
Ellin Street – New Primary Substation in 2015 (developer attributable cost)	P00036	75 Milton St, 83 Headford St, etc.
	P00038	Industry Works Site B, Sylvester Gardens
	P00047	Charter Row/Rockingham Gate/The Moor
	P00055	Moorfoot/NBD South
	P00060	Egerton Street / Hanover Way
	P00065	Furnival Square / Matilda Way
	P00068	Hallam Lane
	P00069	Headford Street / Egerton Street
	P00081	Moore Street / Fitzwilliam Street
	P00109	Site of Universe Works, 97 Mary Street, Sheffield, S1 4RT

TABLE 1.4 – Ellin Street Primary Substation

To ensure that there is a developer benefit it is suggested that the 7 sites local to Arundel Street Primary Substation are not developed until the load transfer from Ellin Street has taken place in 2017, otherwise alternative methods of funding might be required to remove constraints upon development. The following sites are affected:



Primary Substation Reinforcement	Site No.	Site Name
Arundel Street – De-load to Ellin Street in 2017 as part of YEDL capital investment programme	P00032	Pinstone Street / Union Street
	P00039	Shoreham St/Sidney St
	P00041	Car park at Arundel St/Charles St
	P00054	Cross Turner St/Fornham St
	P00063	Eyre Lane/ Matilda Street/ Arundel Street/ Furnival Street
	P00080	Matilda Street/ Arundel Street/ Newton Lane
	P00111	St Mary's Road / Suffolk Road / Fornham Street

TABLE 1.5 – Arundel Street Primary Substation

1.3.7 Telecommunications

A South Yorkshire regional investment programme to deliver next generation broadband to Sheffield, Rotherham, Doncaster and Barnsley is significantly progressed; funding has been secured via a number of stakeholders, a special purpose vehicle (Digital Region Ltd) has been founded, which has appointed a team led by Thales (including Alcatel and KCOM) to design and build the primary infrastructure over the next few years. Thales has not provided the current programme and has not provided detail design information (although WYG has entered into a confidentiality agreement with Thales Transport and Security Ltd).

This programme will deliver a new digital infrastructure hub in Doncaster with a new core radial network – mostly new physical assets however a section of Virgin Media network will be utilised – including a core node at Attercliffe Telephone Exchange. The new assets in Attercliffe Telephone Exchange will support optic fibre extensions to all other Telephone Exchanges in Sheffield, which will in turn support optic fibre networks to downstream cabinets across Sheffield. Digital Region Ltd digital cabinets will be co-located in public highway locations with existing BT cabinets.

Digital Region Ltd does not have an agreed mechanism for connecting new development and therefore the apportionment of costs for funding network extensions to new developments is not known. This should be considered further by the Board of Digital Region Ltd.

BT Openreach (the regulated distribution network company owned by BT) is investing in their 21st Century Networks programme across Sheffield. This will deliver ADSL2+ specification across their networks, which will enable Broadband provision to be at least at the level prescribed in the Digital Britain initiative. Unfortunately BT Openreach has not been a willing participant in this study because of commercial confidentiality issues and further detail is not available.



1.3.8 Physical Development Constraints from Existing Services

Many of the 319 development sites that form the basis of this study currently contain existing underground and occasionally above ground utility services. This study does not consider the impact of standard distribution mains and services, which are considered normal risks of development, but has considered the impact of larger strategic and trunk services. These services could constrain development quite considerably because of environmental health implications (extra-high voltage power lines and foul pumping stations etc.) and-or safety considerations (high-pressure gas pipelines and storage facilities) or more modestly because of legal Rights of Access such as Wayleaves or Deeds of Easement which may be operated in perpetuity by the statutory utility undertakers.

The costs of diverting and altering existing strategic (trunk) utility services over the duration of the Sheffield Development Framework will be substantial at circa £12,554,125. (NOT including an estimated £2,800,000 to £12,000,000 for BT Openreach trunk networks).

More than 60% of the £12.5M costs for trunk utility diversions will be required in the Central and Eastern Community Assembly Areas.

1.3.9 District Energy

Delivery of the City Centre Masterplan (and the wider Sheffield Development Framework) will very likely require further investment in low to zero-carbon or renewable energy assets at a district-wide and-or building integrated scale in order to comply with national, regional and emerging local planning policy. Typically the economies of scale associated with district energy networks in urban environments will derive better unit costs for carbon abatement than building integrated or standalone technologies. The generation of low-carbon or renewable electricity directly onto local distribution and transmission networks is outside the scope of this study as this infrastructure need does not directly influence economic and-or population growth. The exception is the proposed Blackburn Meadows Biomass Powerstation which has the potential to supply renewable heat to existing energy users and substantial new development (20 of the 319 new development sites considered in this study are within a 1500m radius of Blackburn Meadows).

District Energy Connection Potential

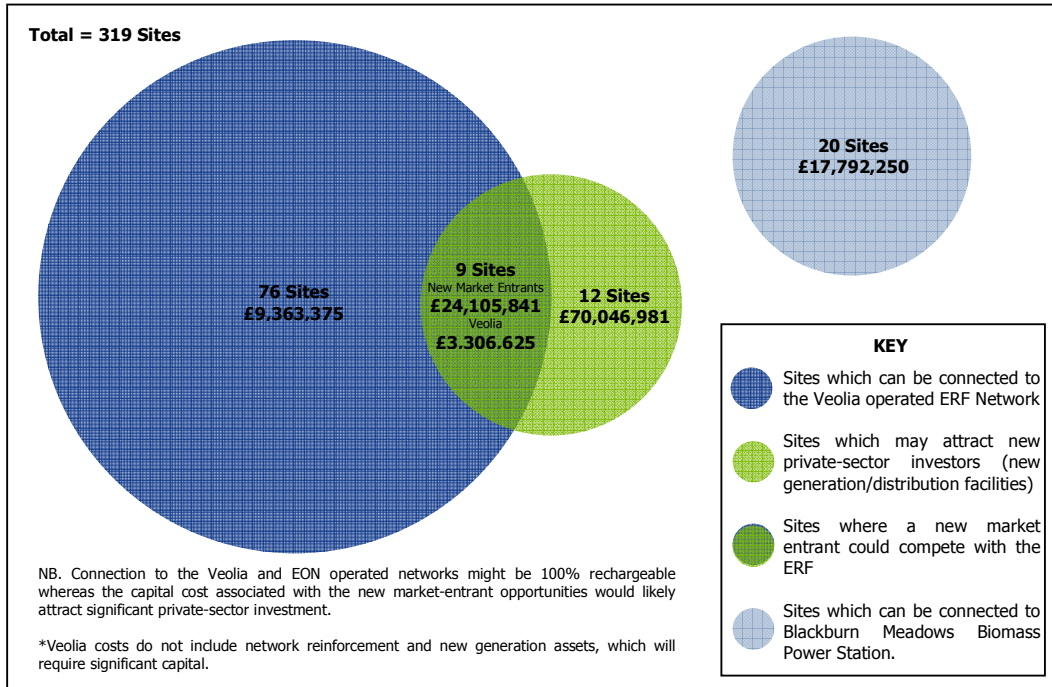


FIGURE 1.2 – District Heating Connection Potential

This study identifies that 117 of the 319 proposed development sites, including almost all of the sites within the City Centre (including 20 sites within 1500m of Blackburn Meadows) could be supported by financially viable district energy facilities. Capital costs of district energy investment are illustrated in Figure 14 but the capital costs associated with connection to the Veolia operated District Energy Network (the wider Energy Recovery Facility network) are based only on network extensions and new connections only – NOT network reinforcement and new generation facilities.

Veolia has estimated that there is currently 21MW of headroom on the network at peak demand (suggesting that the current peak demand from the network is approximately 39MW) and it is considered probable that Veolia will augment the reduction in the residential waste stream over the life of Energy Recovery Facility (ERF) with waste from outside the City in order to maintain peak supply capacity at its current rate (43MW from the ERF with the remainder from oil and gas led district boilers across the City Centre). It is likely that the Veolia operated District Energy network could physically be connected to 85 out of the 319 potential new development sites however this level of network development would certainly require considerable reinforcement of the existing distribution network with larger distribution mains - in addition to network extensions and service connections. Further, the connection of all 85 new sites would almost certainly trigger



the need for new generation assets also. The cost of network extensions and connections (NOT including network reinforcement and new generation facilities) would be circa £12.67m. Until the Veolia operated network is modelled more comprehensively the capital costs of network reinforcement and new generation investment cannot be ascertained.

It is understood that there has been discussion between Eon and Veolia in regard to a connection of heat between the ERF and the proposed Biomass Power Station at Blackburn Meadows; this would potentially mitigate the need for further generation assets in the City Centre, however these discussions did not progress further than preliminary stages.

Veolia (ES) Sheffield Ltd has stated that “the capital cost of a connection is recovered through long term revenue receipts”, which would indicate that the costs of new generation assets, network reinforcement, network extensions and service connections should be shared between Veolia and each developer. The apportionment mechanism has not been provided.

Although 85 sites are sufficiently close to the existing Veolia operated district heating network there are certainly opportunities for a new market entrant to invest in a new generation facility and distribution network (approximately 21 sites are located in various discreet clusters and-or are in proximity to large energy users to attract investment from new Energy Services Companies (ESCo) under a Design, Build, Fund, Operate and Maintain model.



District Energy Opportunities

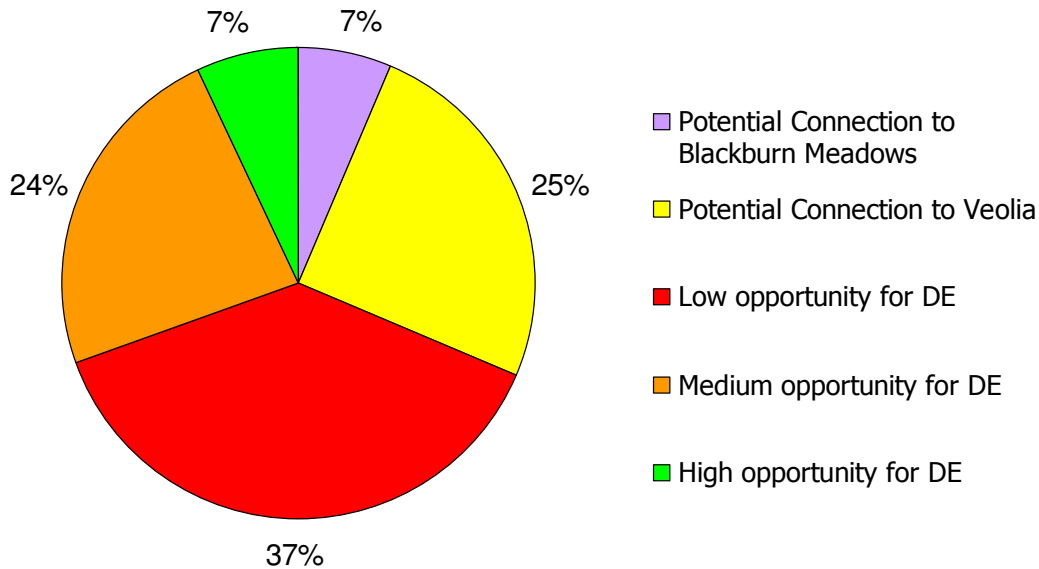


FIGURE 1.3 – District Energy Opportunity Breakdown for 319 provisional SDF allocations

If all new developments where there is a good commercial and technical opportunity to develop a new district energy facility were able to attract investment the investment need might be somewhere approaching £94M

1.3.10 Carbon Emissions

Sheffield City Council has adopted Policy CS65 within the SDF Core Strategy which mandates that all new development will deliver a 20% reduction in carbon emissions beyond that mandated by the anticipated step-changes in Building Regulations in 2010, 2013 and 2016. To illustrate the affect of Policy CS65 it is estimated that the 319 sites in this study would collectively generate 189,603 tonnes of CO₂ per annum in 2026 based on construction to current Building Regulation Standards (not including existing stock). This is an increase of approximately 5% compared with the 2007 estimated emissions of 3,693,0051 tonnes of CO₂, or an increase nearer to 16% if compared to a contemporary estimate of domestic CO₂ emissions in Sheffield.

If all new development was designed and constructed using the anticipated step-changes in Building Regulations then emissions would be reduced to 97,500 tonnes per annum (an increase

¹ DECC figures for 2007



of 2.84% in CO₂ compared with 2007). The introduction of Policy CS65 would further reduce emissions to approximately 78,350 tonnes of CO₂, which an increase of 2.27% is compared with 2007 CO₂ estimates as highlighted in the figure below.

Carbon Benefit of Policy CS65

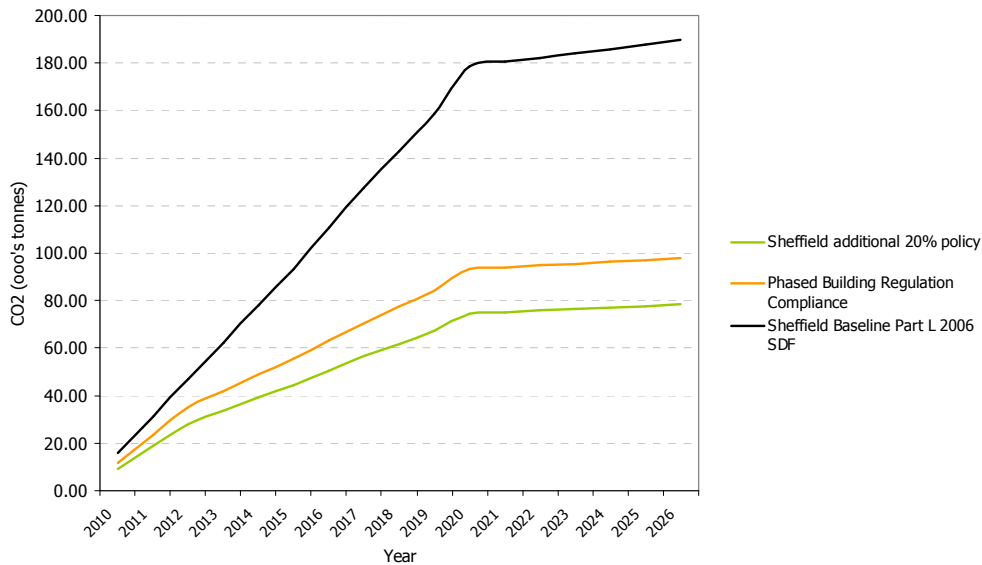


FIGURE 1.4 – Carbon Benefit of Policy CS 65

1.3.11 Green Economy (Sustainable Energy Research)

Sheffield has two progressive universities both with a good track record of developing new energy efficient and renewable energy technologies.

The University of Sheffield is pro-active in maximising the returns from its knowledge base. Fusion IP owns 100% of the rights to the University of Sheffield’s Intellectual Property (IP) and is a mechanism to develop the emerging technologies and research into businesses that eventually become independent companies.

Sheffield Hallam University has set up a Sustainability Hub to act as a conduit for information exchange within the university. A number of academic and non-academic staff feed into this internal online community and its forum meetings. The aim of the network is to showcase outputs of research and business development projects, promote information exchange, foster debate, and share insights into regional, national and international policy and practice.



Sheffield Hallam University has recently set up a consultancy called Hallam Energy in order to use the university's specialism's in order to maximise the benefit of existing technologies and to develop technologies further. Hallam Energy has set up a link with North East Derbyshire District Council in order to provide its expertise on a consultancy basis and has been successful in work with several different clients to evaluate product performance, provide energy and waste options and advise on product development.

It is recommended that Creative Sheffield/Sheffield City Council consider a Green Economy hub operated in the same manner as the Sheffield Hallam University Sustainability Hub.

1.4 Summary of Abnormal Risks and Costs

1.4.1 Diversions and Alterations of Existing Services

The costs of diverting and altering existing trunk (strategic) utility services to accommodate the 319 development sites provided by Sheffield City Council is estimated at circa £12.5 (NOT including an estimated £2.8M to £12M for BT Openreach trunk network assets).

This does NOT include the diversion of standard distribution mains and services – which are considered to be a 'normal' development cost.

This indicative budget cost does not include the cost of diverting high-pressure gas mains, 275/400kV electricity assets, very large/deep trunk sewers or stormwater culverts – these assets would be retained in-situ with existing Wayleaves or Deeds of Easement and in some cases a significant buffer for safety and environmental health purposes (up to 300m for high-pressure gas mains and 60m for overhead 275/400kV power lines). The land value losses associated with the sterilisation of development land has not been calculated.



Trunk Service Alteration Cost

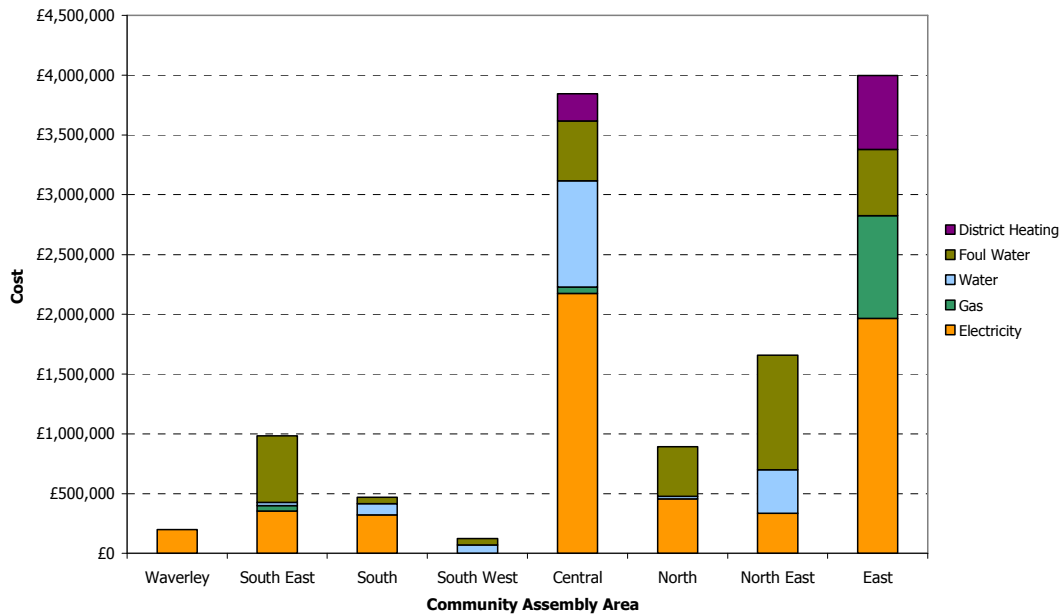


FIGURE 1.5 – Trunk Service Diversion / Alteration Cost (Community Assembly Areas)

1.4.2 Abnormal New Connection Needs

All new connection costs presented in this study are considered 'abnormal', i.e. these are costs associated with non-standard infrastructure procurement. For example the costs associated with onsite distribution mains, cables and sewers, secondary substations, medium to low pressure gas governors, metered service connections, internal risers, local off-site network connections, and standard water and sewerage infrastructure charges are not included in the costs presented here.

The projected abnormal new connection utility investment need to deliver the SDF to 2026 is estimated to be c.£30.5M (including Yorkshire Water's current estimate of £4M for pumping stations, foul sewerage and sewage treatment for Waverley).

Further foul water pumping stations may be required as a result of the elevation of an individual site but these costs are NOT included as they are not required to support a network incapacity issue and are therefore not considered as an 'abnormal' cost.



Abnormal Utility Connection Costs

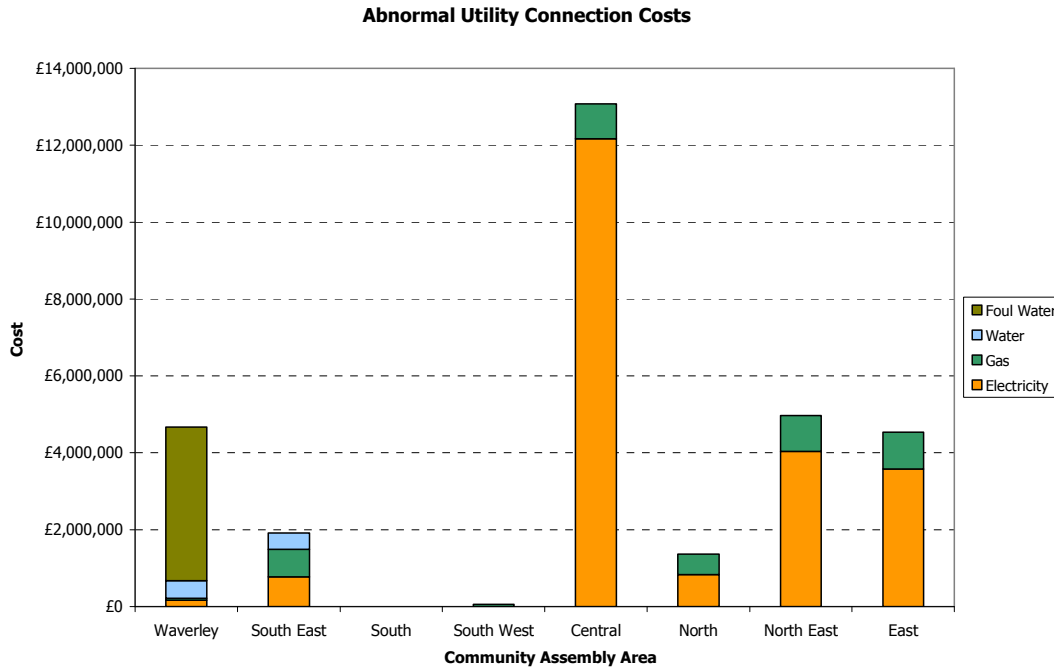


FIGURE 1.6 – Abnormal Utility Connection (Utility Assembly Areas)

1.4.3 Total Utility Investment Need

The total projected utility investment need to deliver the SDF to 2026 is £42.7M. This includes both trunk diversions and strategic network reinforcements. This figure does NOT include an estimated £2.8M to £12M to divert BT Openreach trunk networks. This does not include diversions of standard distribution mains and services or new mains and services, which are considered to be typical to most forms of new development and will be developer funded.



Cumulative Utility Investment Need

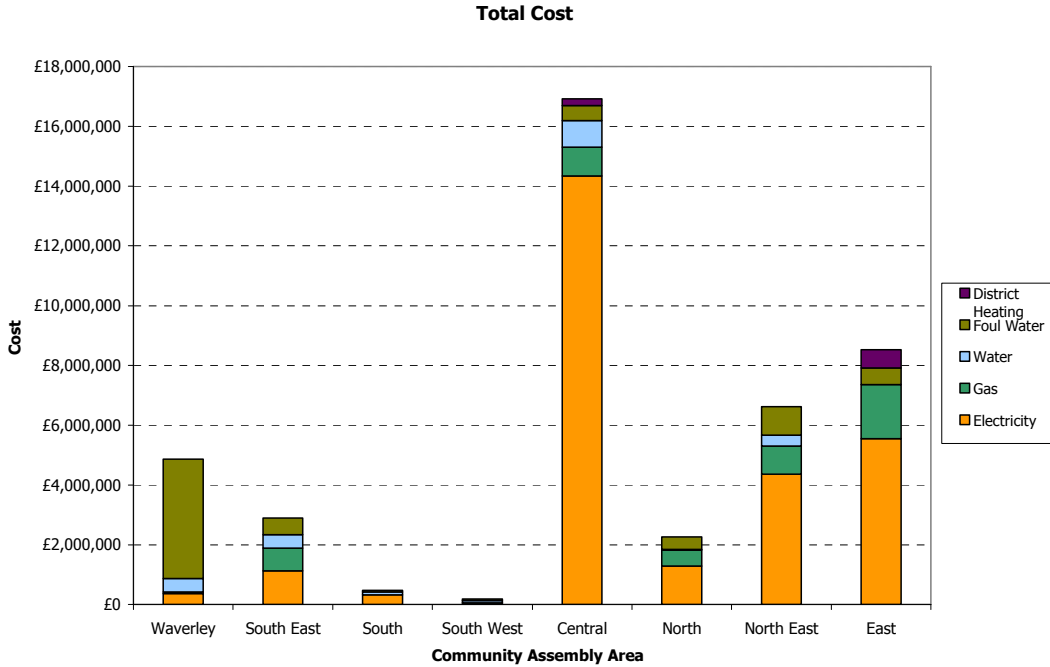


FIGURE 1.7 – Cumulative Investment Need (Community Assembly Area)

Cumulative Total Abnormal Utility Investment Need

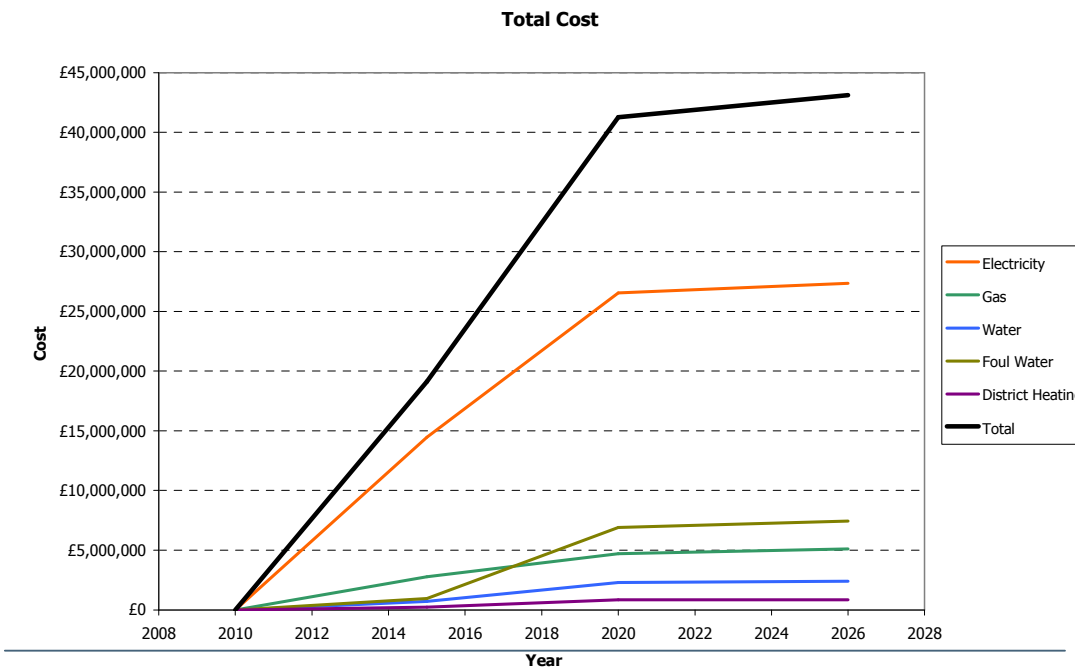


FIGURE 1.8 – Cumulative Investment Need (Total)



1.4.4 Unit Cost per Square Metre

The figures below identifies the cumulative diversion and abnormal utility connection costs per square metre of gross developable area - The mean average investment is £11.42 per m2 of gross developable area.

Unit Cost per Square Metre - Abnormal Utility Connection Cost Only

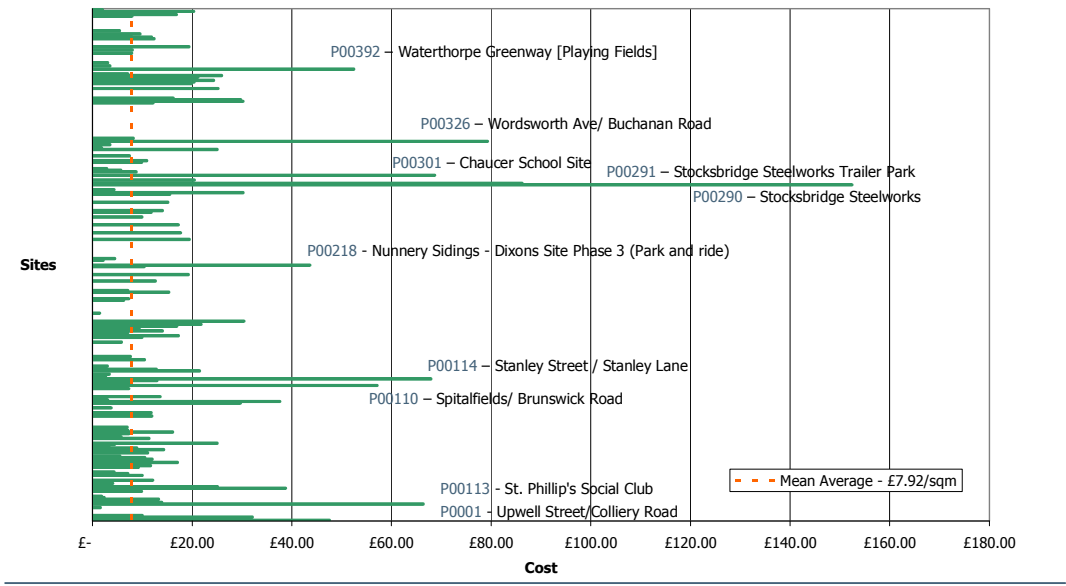


FIGURE 1.9 – Unit Cost per Square Metre (gross development area) - Abnormal Utility Connection Cost Only

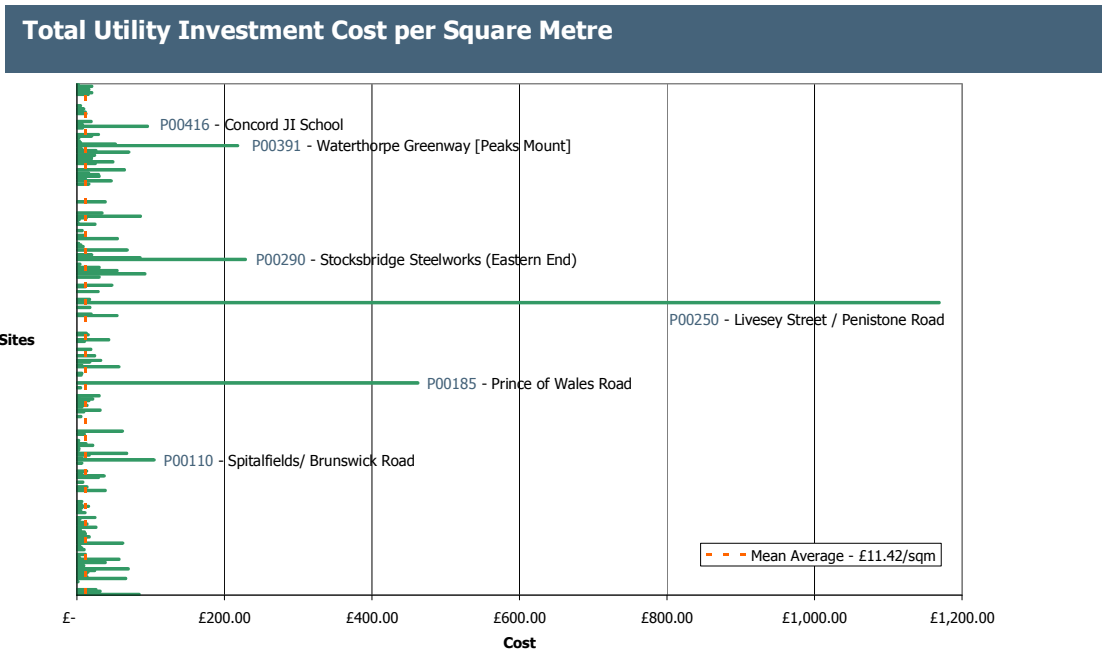


FIGURE 1.10 – Total Utility Investment Cost per Square Metre (gross development area)



1.5 Planned Capital Investment Works by Utility Undertakers

As a result of this study and each undertaker's own studies there are a number of investment projects included in the AMP5/DPCR5 5-year capital investment programmes (2010 to 2015) and there appears to be some commitment in AMP6/DPCR6 (2015 to 2020). These projects include:

Utility	Investment Plan	Timescale
Sewerage	Sewage Treatment Works enhancements at Woodhouse Mill STW and Blackburn Meadows STW	2010-2015
Gas	The Barnsley Gas Network Reinforcement	2011-2012
Electricity	Ellin Street 33/11kV Primary Substation	>2015
Electricity	Claywheels Lane 33/11kV Primary Substation transformer replacement (creating an additional 6MVA)	2010
Electricity	Blackburn Valley 33/11kV Primary Substation transformer replacement (creating an additional 6MVA)	2013
Electricity	Saxon Road 33kV switchgear replacement	2016
Electricity	11kV network reinforcement to transfer load from Silver Street Primary Substation to Blue Boy Street Primary Substation	2016
Electricity	11kV network reinforcement to transfer load from Arundel Street Primary Substation to Ellin Street Primary Substation creating a further 5MVA at Arundel Street (2017
Decentralised Energy	Blackburn Meadows Biomass Power Station	Ongoing

TABLE 1.6 – Planned Utility Investment Need



1.6 Recommendations and Next Steps

1.6.1 City Centre Masterplan

The key strategic utilities risks associated with the City Centre Masterplan are insufficient electricity distribution network capacity and insufficient district heating network capacity. Both of these issues can be mitigated with sufficient investment, however careful planning could limit the quantum of public sector investment.

YEDL (the regulated Distribution Network Operator for Sheffield and part of the CE Electric Group) has committed capital investment either in 2010-2015 (DPCR5) or 2015-2020 (DPCR6) that will in-part mitigate the need for significant developer contributions; to benefit from these planned capital investment works the delivery timeline for a number of City Centre sites must be carefully considered – as the programme of City Centre development will be market led then alternate methods of funding infrastructure in order to remove constraints upon development may be required. Those sites that will trigger abnormal investment need if developed before 2011, 2016 and 2017 are highlighted in this report. Should these highlighted sites be developed before YEDL undertake their planned capital works the developer-led investment need will be approximately £3m-£4.5m per Primary Substation upgrade (not including land). In theory any developer investment will be equitably apportioned across all sites benefitting but this ‘apportionment’ of capital only operates for 5-years from each investment.

District Energy can potentially play a crucial role in the delivery of a low carbon economy and the City of Sheffield has a valuable asset in its existing district heating network. Veolia (ES) Sheffield Ltd (the current operator of approximately 44km of district heating pipes on behalf of Sheffield City Council) has confirmed that there is insufficient capacity in the network to support the whole of the City Centre Masterplan. The existing piped network is the most critical constraint and upgrading and reinforcing of the network will be required before the need for new generation facilities will be triggered. Thermal energy (heat) generation is less critical as there is currently significant headroom from gas and oil led top-up facilities outside the Energy Recovery Facility.

Further consultation is required with Veolia (ES) Sheffield Ltd to understand how the upgrading of the heat distribution network will be funded and to obtain further transparency with regard to the sharing of capital costs for new district energy connections. A protocol for diverting existing district heating pipes is also required.



There are numerous options for establishing and funding new district heating facilities and this study has identified opportunities within and outside the City Centre. It is recommended further investigation is undertaken to identify those opportunities highlighted in this study in consultation with landowners, developers and existing large energy users. This might ultimately determine district energy opportunities across the City that could attract substantial private-sector investment, develop a competitive marketplace in district energy provision and keep Sheffield at the cutting-edge of decentralised energy provision in the UK.

1.6.2 Sheffield Development Framework

In addition to limited electricity distribution network capacity and district heating network capacity in the City Centre there is limited Sewage Treatment capacity in the wider City; this could lead to planning objections from the sewerage undertaker.

Yorkshire Water Services has committed to capital investment programmes either in 2010-2015 (AMP5) or 2015-2020 (AMP6) that should mitigate the need for significant developer contributions; to benefit from these planned capital investment works the delivery timeline for a number of sites must be carefully considered.

The capital costs associated with upgrading Sewage Treatment Works will not likely be fundable through normal developer led activities without additional public-sector investment and therefore development could be effectively frozen until Yorkshire Water Services are able to programme these works within their regulated business planning activities. Those sites that might be affected by lack of sewage treatment capacity are those located within the Handsworth and Woodhouse, Stocksbridge, Gleadless Valley, Beighton and Mosborough, and Hackenthorpe clusters.

It is important that any new allocated site gets adopted within the Sheffield Development Framework at the earliest opportunity as this effectively mandates the Sewerage Undertaker to invest in sewage treatment facilities. Adoption of the Sheffield Development Framework in 2013 should allow any further investment in Sewage Treatment facilities within AMP6 (2015 to 2020).

The most important activity is for Sheffield City Council Forward Planning to maintain a dialogue with each of the incumbent utility undertakers to share demand forecasting data, spatial planning data (including sites for new infrastructure) and to explore multi-stakeholder value engineering opportunities including joint forward investment initiatives within or outside current regulated frameworks – the latter might be considered an economic development activity and might be undertaken via Creative Sheffield or Yorkshire Forward.



Sheffield City Council should ensure that the GIS database supplied as part of this study is kept in a contemporary format.