


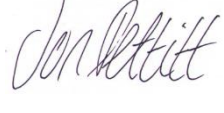

Swadlincote Energy Recovery Facility
Cost Benefit Assessment
Appendix 1
Heat Opportunities Report

January 2024

Prepared By



Project Quality Control Sheet

ORIGINAL	Author	Checked by	Approved by
Signature			
Date	18/01/2024	18/01/2024	18/01/2024
Company	Aardvark EM Ltd	Aardvark EM Ltd	Aardvark EM Ltd

Location: Willshee's Depot 3, Keith Willshee Way, Swadlincote, DE11 9EN
Grid Reference: SK268190
Project Manager: Alan Taylor AMRINA CEng MEI
Report Author: Alan Taylor AMRINA CEng MEI
Report Number: 2354-R002-04 SERF CBA Appendix 1 – Heat Opportunity Report
Report Status: Final

Copyright: All copyright in this document is reserved.

Liability: This document contains information and may contain conclusions and recommendations. Every effort has been made to ensure that the information is accurate and that the opinions expressed are sound. However, Aardvark EM Limited cannot be made liable for any errors or omissions or for any losses or consequential losses resulting from decisions based on the information.

Report Written and Produced By

Aardvark EM Limited, Higher Ford, Wiveliscombe, Taunton, Somerset, TA4 2RL

Telephone: 01984 624989, Facsimile: 01984 623912

Email: environment@aardvarkem.co.uk, Web: www.aardvarkem.co.uk

Contents

wq

1	Introduction	1
2	Heat Opportunity Selection Criteria	2
2.1	General.....	2
2.2	Distance.....	2
2.3	National and local policy context.....	2
2.4	Methodology for assessing potential heat loads.....	4
3	Heat Opportunity Assessment	6
3.1	Assessment results	6
3.1.1	Willshee’s MRF (a).....	9
3.1.2	Mulberry Logistics (b).....	9
3.1.3	IVC Brunel – Sites 2 and 3 (n, r)	9
3.1.4	Civic Centre (u-y)	9
3.1.5	The Pingle Academy (z).....	9
4	Heat Opportunity Conclusion	11

1 Introduction

R&P Clean Power Ltd are applying for an environmental permit for a facility known as the Swadlincote Energy Recovery Facility (SERF) to be located at Keith Willshee Way, to the south Swadlincote in Derbyshire. The post code for the site is DE11 9EN and the grid coordinates for the centre of the site are SK268190.

SERF Includes an Energy Recovery Facility (ERF) designed to accept up to 186,000 tonnes of Refuse Derived Fuel (RDF) per annum, and will generate approximately 20.5MW of electricity (gross), of which 18.5MW will be exported to the local electricity distribution network operated by National Grid Electricity Distribution (NGED).

Guidance from the Environment Agency indicate that the Best Available Technique (BAT) for energy efficiency for new energy from waste facilities with a throughput of non-hazardous waste in excess of 3 tonnes per hour is considered to be met if a supply of heat is provided to a district heating network or industrial/commercial use where technical and economic opportunities exist.

This report presents the results of a study to identify technically and economically viable heat loads with the context of the site.

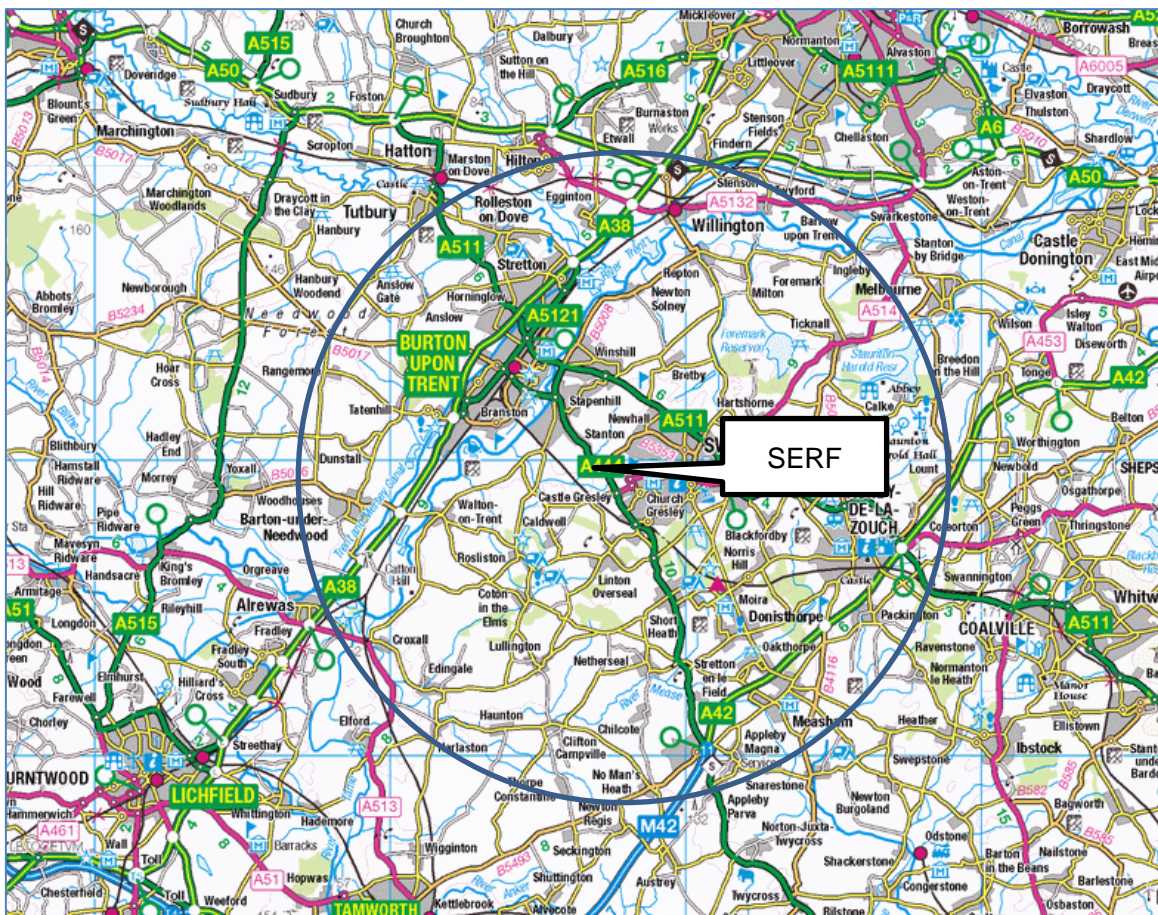


Figure 1 - Site Location

2 Heat Opportunity Selection Criteria

2.1 General

The proposed facility lies approximately 2km to the south west of Swadlincote and around 6km from the larger conurbation of Burton upon Trent to the north west. The site itself is on an area of land formerly used for railway infrastructure and is bordered by industrial and commercial land uses. The site is bounded by the A444 to the east, active railway to the south west and waste water infrastructure to the north. Beyond these features, new residential and commercial areas are being developed, primarily to the east.

2.2 Distance

The distance to a heat load is a significant factor in both technical and commercial viability in the location of potential heat loads with longer distances not only inevitably more expensive to construct, but also increase the heat loss incurred within the transmission and hence the overall energy efficiency of the proposal. Guidance¹ indicates that the area of search for plants with less than 300MW should be 10km. This is shown on Figure 1 and indicates that the main potential for appropriate heat demands are likely to be within the Burton and Swadlincote area.

2.3 National and local policy context

The potential for heat distribution from biomass, energy from waste facilities and combined heat and power in the area of Swadlincote and South Derbyshire has not been specifically assessed recently, although is considered within local initiatives incorporated into the South Derbyshire District Council (SDDC) Climate and Environment Action Plan 2021-2030². This plan identifies the importance of the space heating for future carbon reductions, and envisages circumstances where a district heating network may provide significant benefits.

This view is reinforced by the data collected by the CHP focus mapping undertaken by the Department of Energy and Climate Change (DECC, now incorporated into the Department for Energy Security and Net Zero (DESNZ), where only two significant heat demands were identified, with the remainder being lower density housing and commercial demands.

Meeting such building space heat demands (as they require multiple connection points and do not represent year round heat use and can therefore not generally be suitable from a commercial perspective without external funding. Such a conclusion is also in accordance with the results of the National Assessment undertaken by DECC in 2015³, which indicates only limited technical and economically viable opportunity within the area of search (Figure 2) or the above mentioned CHP focus mapping by DESNZ (formerly DECC) (Figure 3).

¹ CHP Ready Guidance for Combustion and Energy from Waste Power Plants V1.0, Environment Agency, 2013

² South Derbyshire District Council Climate and Environment Action Plan 2021-2030, Ref STEMS-07-ST2-F1 July 2022

³ National Comprehensive Assessment of the Potential for Combined Heat and Power and District Heating and Cooling in the UK; Ricardo-AEA Ltd on Behalf of the Department of Energy and Climate Change, 2015

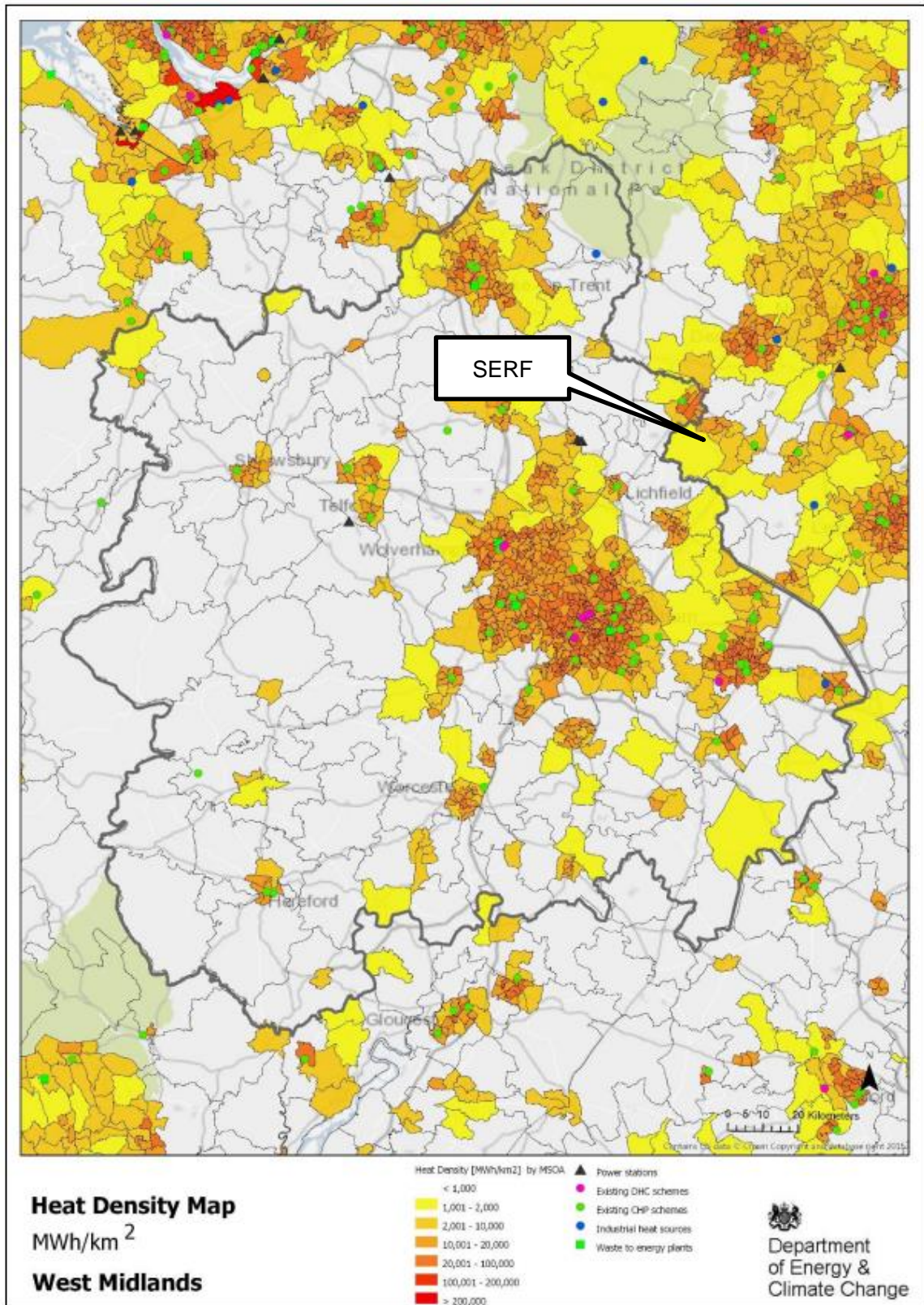


Figure 2 - Heat density map for West Midlands of England

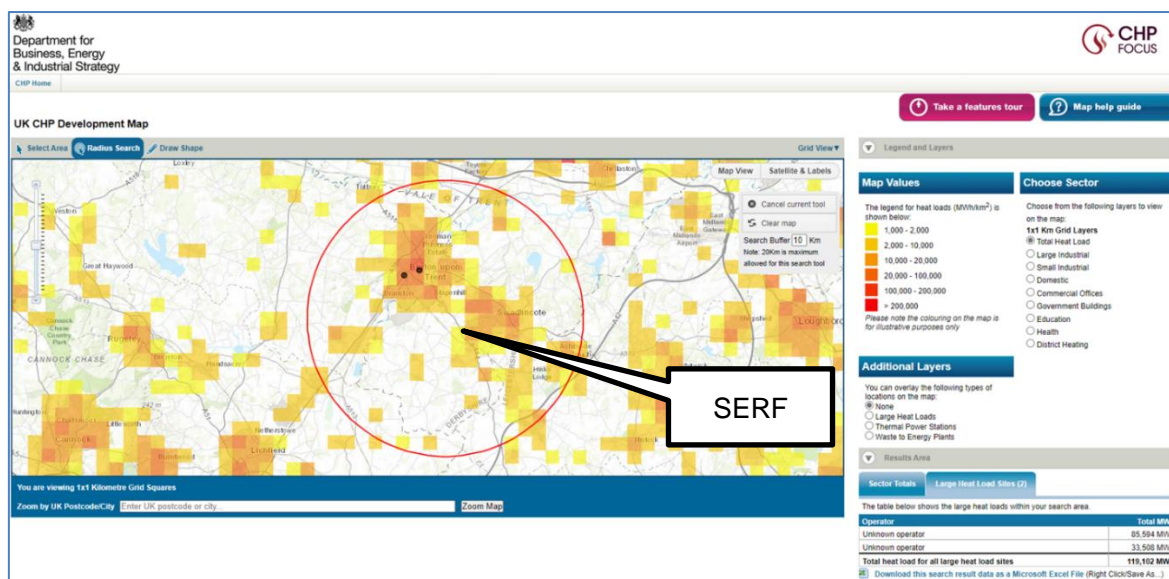


Figure 3 - Extract from the DESNEZ/DECC Heat Map⁴

2.4 Methodology for assessing potential heat loads

As within the immediate vicinity of SERF there are no process heat loads (that could be served by the provision of steam), the majority of potential is assumed to be from space or hot water requirements of buildings. Data on floor areas has been obtained for different building use types (hospitals, residential healthcare, hotels, leisure and manufacturing) and an assessment made of the expected average heat demand. This has been limited to potential annual heat demands that are in excess of 10MWh per annum to enable screening of those that are the most economically viable. This equates to an average heat demand of 1.1kW. However, the seasonal impacts of heat requirements would indicate that this demand may vary between 4-6kW in winter and zero in summer.

Once the most significant heat loads had been identified, the geographic and topographic constraints have been considered. Significant considerations include:

- Grouping of heat loads - this can be reduce significantly the cost per connection.
- Impact of existing infrastructure – crossing of physical features such as rivers, main roads and railways can have a significant impact on the viability of connections due to the physical challenges of constructing and maintaining crossings and the potential additional capital and operational costs. These can be categorised into ‘hard’ and ‘soft’ constraints, with hard constraints proving prohibitively expensive and technically challenging cross when considering the scale of the development
- Development status of pipeline route – land that has been developed can be not only problematic to gain consent from landowners to cross, but can also be very expensive to cross compared to pipeline routes that cross soft surfaces such as agricultural land or roadside verges.

⁴ This map shows potential heat demands to promote the development of CHP projects see [UK CHP Development Map - Department for Business, Energy and Industrial Strategy \(decc.gov.uk\)](https://www.decc.gov.uk) (now incorporated into the Department for Energy Security and Net Zero (DESNEZ))

Figure 4 below provides a constraint mapping for the area around the facility and highlights the priority potential heat loads that have been taken forward in this assessment.

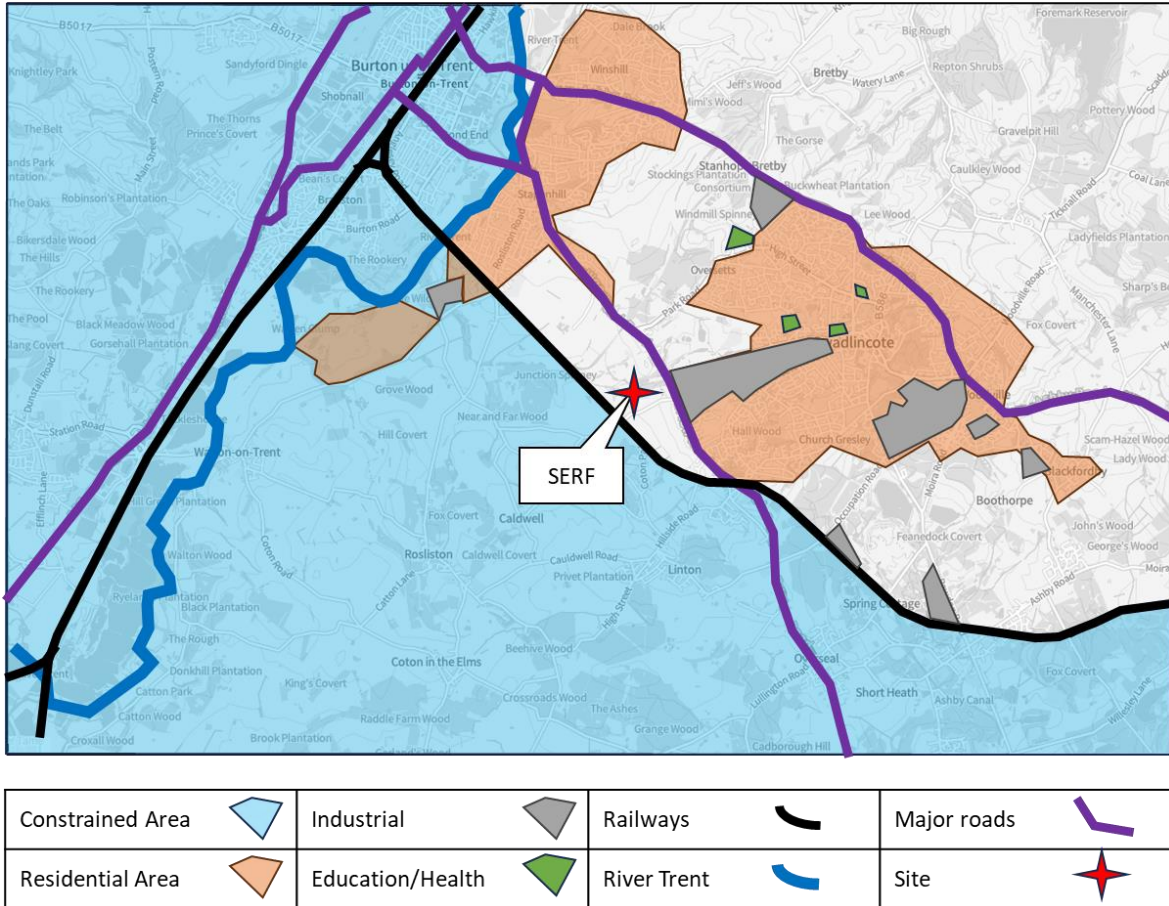


Figure 4 - Constraint mapping for potential heat loads

3 Heat Opportunity Assessment

3.1 *Assessment results*

Figure 5 and Table 1 on the following pages detail the results on the heat load assessment. The assessment has identified a number potential heat loads outside of the constrained area that are significant, and merit additional consideration. These are addressed in turn in the sections that follow.

Swadlincote Energy Recovery Facility – Heat Opportunities Report

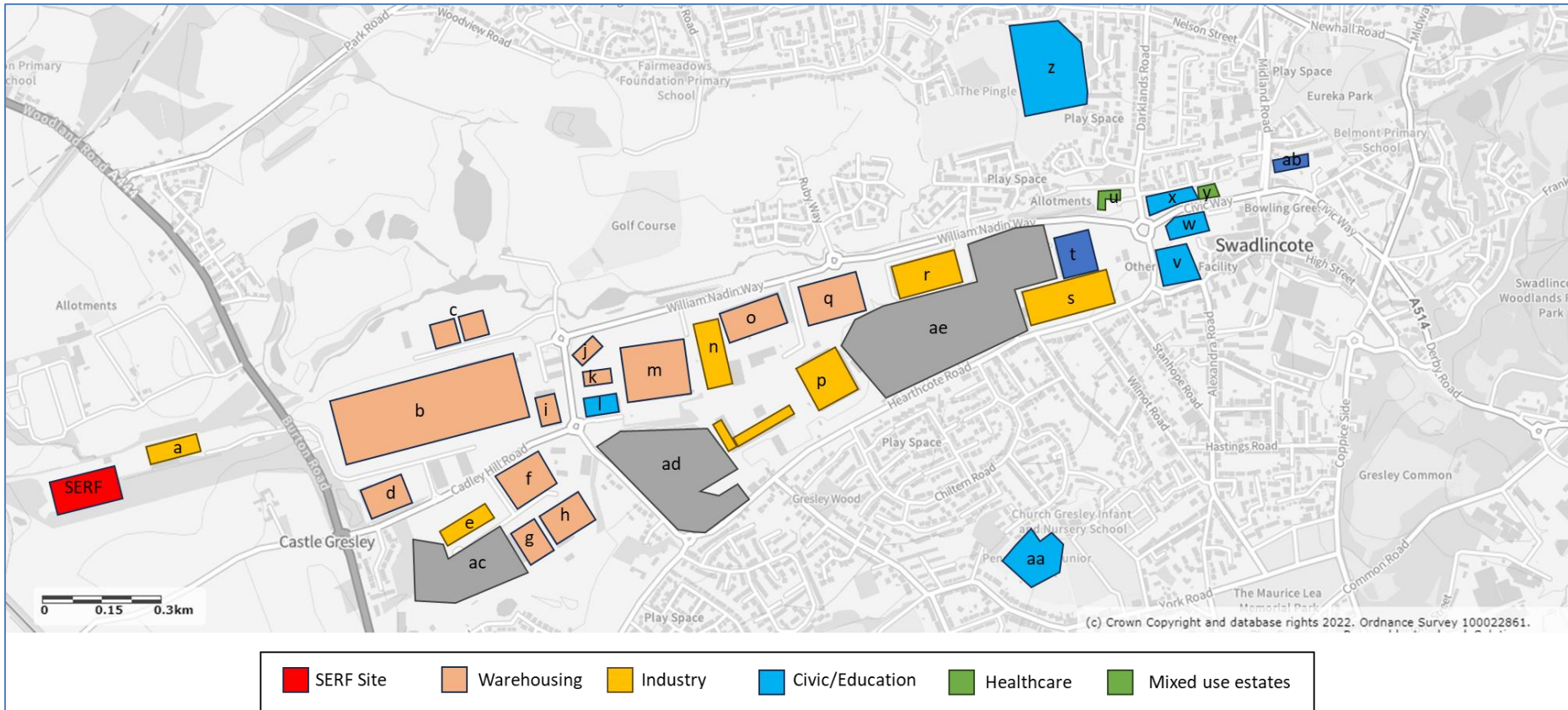


Figure 5 - Heat Demand Assessment Key

Swadlincote Energy Recovery Facility – Heat Opportunities Report

Table 1 - Heat Demand Assessment

Map Ref	Site Occupier	Assumed Use Category	Max Demand	Min Demand	Winter	Spring	Summer	Autumn	Total	Distance
			kW	kW	MWh	MWh	MWh	MWh	MWh	(Direct, approx) m
a	Wilshees	Wilshees MRF	810	45	1,774	936	99	1,330	4,139	220
b	Mulbery Logistics	Distribution Centre (in construction)	2,214	27	4,849	2,454	59	3,636	10,998	890
c	Not occupied	New business units	360	20	788	416	44	591	1,840	1,050
d	WestRock Packaging	Distribution	672	4	1,472	741	9	1,104	3,326	740
e	Trelleborg	Trelleborg Manufacturing & Distribution	846	47	1,853	978	103	1,390	4,323	970
f	A H Allen	Steel stockholding	446	3	976	491	6	732	2,204	1,080
g	Keystone Lintels	Distribution	502	3	1,100	553	7	825	2,485	1,120
h	IG masonry Support	Distribution	608	4	1,330	669	8	998	3,006	1,210
i	Various occupiers	Trade counters	810	45	1,774	936	99	1,330	4,139	1,170
j	IVC Brunel (Site 3)	Manufacturing (pharmaceutical)	1,344	448	2,943	1,962	981	2,453	8,340	1,290
k	Various occupiers	Trade counters	432	24	946	499	53	710	2,208	1,300
l	Burton & Sourth Derbyshire College	Education	1,188	132	2,602	1,445	289	2,024	6,360	1,300
m	Clipper Logistics	Distribution	1,717	11	3,761	1,892	23	2,821	8,496	1,460
n	IVC Brunel (Site 2)	Manufacturing (pharmaceutical)	1,920	640	4,205	2,803	1,402	3,504	11,914	1,610
o	TNT/Restore Records Management	Distribution/Records storage	105	1	231	116	1	173	521	1,740
p	Roger Bullivant	Manufacturing (concrete products)	1,700	340	3,723	2,234	745	2,978	9,680	1,600
q	Jenkins	Distribution	972	6	2,129	1,071	13	1,597	4,809	1,940
r	IVC Brunel (Site 1)	Manufacturing (pharmaceutical)	2,880	960	6,307	4,205	2,102	5,256	17,870	2,180
s	Dellner	Manufacturing (Engineering)	1,530	170	3,351	1,862	372	2,606	8,191	2,520
t	Sainsbury's	Retail	1,789	99	3,919	2,068	218	2,939	9,143	2,580
u	Cadley Hill View	Healthcare (residential home)	1,512	504	3,311	2,208	1,104	2,759	9,382	2,690
v	Green Bank Leisure Centre	Green Bank Leisure Centre (includes pool)	1,224	408	2,681	1,787	894	2,234	7,595	2,820
w	South Derbyshire Distric Council	Civic Offices	1,035	58	2,267	1,196	126	1,700	5,289	2,880
x	Police Station	Civic Offices	151	8	331	175	18	248	773	2,900
y	Swadlincote Care Centre	Healthcare (care centre)	981	327	2,148	1,432	716	1,790	6,085	2,940
z	The Pingle Acedemy	Education (Primary and Secondary Schools)	4,620	550	10,118	5,661	1,205	7,588	24,572	2,650
aa	Pennine Way and Church Greasly Infant	Education (Primary School)	932	111	2,042	1,143	243	1,531	4,959	2,470
ab	Lidel	Retail	396	22	867	458	48	650	2,024	3,180
ac	Appleby Glade Ind Estate	Business units (mainly trade counters)	900	90	1,971	1,084	197	1,478	4,730	929
ad	Boardman Road Ind Estate	Business units (mainly engineering)	2,232	124	4,888	2,580	272	3,666	11,406	1,460
ae	Robian and George Holms Way	Business units (mixed)	8,100	450	17,739	9,362	986	13,304	41,391	2,370

3.1.1 Willshee’s MRF (a)

This building houses process and sorting equipment that are intended to be partially supplied with electricity by the SERF under a private wire agreement. Whilst currently, the MRF does not require any specific process heat, its availability at a potentially favourable price, may mean that techniques could be of interest in the future. For example, the processing, refinement of depolymerisation of plastics can require heat to be applied. As such, this may be an opportunity for heat distribution that arises once SERF is established.

3.1.2 Mulberry Logistics (b)

This significant warehouse and distribution centre is situated in close proximity to the site and could be easily accessed via a buried main. It is understood that the warehouse is currently intended to include a radiant heating systems where natural gas is combusted within distributed heaters. Therefore, the warehouse would require the fitting not only of the heat interface units, but also retrofitting of a wet central heating system throughout the building. Such a retrofit would be prohibitively expensive and disruptive to the operations of the facility, and is therefore unlikely to be viable on its own.

However, should a district heating network be established, it may in future be considered alongside other heat customers, or at a point when the facility is refurbished.

3.1.3 IVC Brunel – Sites 2 and 3 (n, r)

IVC Brunel is a multiproduct pharmaceutical company, specialising on a wide range of vitamin and other over-the-counter pharmaceuticals under customer own label brands. As such heat demands are likely to range from those relating directly to product preparation, but also to packing and storage areas within their facilities. IVC Brunel have three sites within the vicinity of a proposed heat distribution line, and therefore as an anchor customer could provide an incentive to the wider establishment of a network.

3.1.4 Civic Centre (u-y)

The potential at this location combines demand of the key civil buildings in the town centre is significant and could be delivered as a single scheme, potentially with grant support. In addition, these demands include the Cadley Hill Care Home, Health Centre and Green Bank Leisure Centre (which includes a swimming pool), which indicates that there would also be a level of heat demand at all times of the year – which is important to realise the full benefits of a heat network connection.

However, there would be complexities in aligning the equipment retrofits required and reaching a conclusion where all parties involved would be able to participate at the same time. However, the municipal authority (South Derbyshire District Council) would be in a strong position to coordinate response and potential lead funding bids based on the decarbonisation of the public estate.

3.1.5 The Pingle Academy (z)

The Pingle Academy is a large, co-educational secondary school long established on a site to the north of the Swadlincote town centre. It is a member of the de-Ferris Trust group of schools

and occupies a range of buildings across a campus site. Whilst most buildings on the site are over 25 years old, they have been supplemented by more modern structures as the school has expanded. Whilst the school does include a swimming pool, that majority of heat demand will be for space heating in winter and therefore predominantly seasonal in nature.

The pipeline route to the school would need to run partially along the main access road to Swadlincote (A514), but could possibly branch underground across green spaces to the school along a proportion of its length.

4 Heat Opportunity Conclusion

The potential heat loads that could be served by the SRRF are highly constrained by the presence of significant infrastructure to the north and west of the site that would pose technical challenges to cross and are considered to be effective barriers to the development of a heat distribution network at the modest scale of the facility.

In addition, being situated on the outskirts of the town centre, there are limited opportunities for heat supply to existing users beyond the urban area. Whilst the establishment of residential district heating network could have been included in the development and regeneration plans for the district, new housing in the vicinity has been equipped predominantly with gas central heating. Regeneration opportunities are also limited, as most housing is detached and/or semi-detached and therefore considered low density and therefore not currently cost effective for retrofitting of alternative heating systems.

The proximity to the A514 junction and availability of land on the site of the former Cadley Hill coal mining area has meant that much of the substantial development in the immediate vicinity of the site is for warehouse and distribution use. A local school campus is within the area of search.

IVC Brunel Healthcare have three major facilities located with 2.5km of the site and therefore represent a most attractive potential for heat supply, particularly as heat requirements are likely to include process heat demands which will not be significantly impacted by seasonal temperature variations.

Finally, as the delivery of sustainable heat has a strong policy objective for the UK Government, it can be expected that new measures structured as either obligations or incentives will be forthcoming in the future, it is recommended that opportunities should be regularly reviewed.