PARSONS BRINCKERHOFF

July 2015

NEW CROSS HEAT NETWORK: ROUTE FEASIBILITY ASSESSMENT

London Borough of Lewisham

3514033A-BEL

Final

New Cross Heat Network: Route feasibility assessment

3514033A-BEL

Prepared for
London Borough of Lewisham

Prepared by
Parsons Brinckerhoff

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ABBREVIATIONS

°C	degrees celsius
ALMO	Arms-Lemgth Management Organisation
CHP	Combined Heat and Power (engine)
DECC	Department of Energy Climate Change
DECC	Decentralised Energy
DHW	Domestic Hot Water
DH	District Heating
EfW	Energy from Waste
EHV	Extra High Voltage
GPR	Ground Penetrating Radar
GW	Gigawatts
GWh	Gigawatt-hour
HA	Housing Association
HIU	Heat Interface Unit
HV	High Voltage
IP	Intermediate Pressure
kW	Kilowatts
kWh	Kilowatt-hour
LBL	London Borough of Lewisham
LP	Low Pressure
LV	Low Voltage
m	metres
m/s	metres per second
mm	millimetres
MW	Megawatts
MWh	Megawatt-hour
NRSWA	New Road and Street Works Act
SCR	Surrey Canal Road
SELCHP	South East London Combined Heat and Power
SH	Space Heating
SL	Street Lighting
SROH	Specification for the Reinstatement of Highway
SSA	Strategic Site Allocation
TfL	Transport for London
TRA	Tenants and Residents Association
WRC	Waste Reception Centre
WSP | PB	WSP | Parsons Brincerhoff

EXECUTIVE SUMMARY

This sheet is intended as a summary only	

WSP | Parsons Brinckerhoff has undertaken a route feasibility assessment for a heat network linking the SELCHP energy from waste facility on Landmann Way and the Goldsmiths, University of London campus in New Cross. The study used a combination of methodologies and resources to find a preferred route for the installation of district heating pipework through an area of south east London that is largely residential and industrial.

LB Lewisham supplied an *initial preferred route* that acted as a starting point for our investigation. The route made use of public highways and, where possible, parks and pedestrian/cycle routes. WSP | Parsons Brinckerhoff agreed that the *initial preferred route* represents the most direct route between SELCHP and Goldsmiths. We also identified additional route options to be assessed as alternatives to the *initial preferred route*.

We undertook multiple site visits, including with a civils contractor, to investigate the physical characteristics of the area and look for any factors that might affect the routing. We also met with LB Lewisham Network Management, Planning, Parks, Cycle Programme and Trees Officers to discuss the proposed route. The outcome of this process is that there are several areas where installation of pipework will be challenging.

There are restrictions on route selection through Surrey Canal Road, as advised by LBL Network Management and Cycle Programme officers. Network Management advised that the pipe should not be installed in the carriageway due to its importance in maintaining traffic flows through the area; and Cycle Programme officers advised that the pipe should not be installed in the soon to be remodelled cycle way to the north of the carriageway as excavating through this area would be unpopular, both politically and within the cycling community.

A potential alternative route along Surrey Canal Road was therefore identified in the south side footway, where many of the existing streetlights are being removed. Another option was also identified in the soft dig land to the north of the cycle path, which is owned by British Wharf Industrial Estate and appears to only contain a small number of utilities.

Parks officers advised that the *initial preferred route* through Folkestone Gardens and Fordham Park should be avoided as the footpath through Folkestone Gardens will soon become part of the new cycle route and Fordham Park has recently been remodelled. As such, alternatives have been assessed using Trundley's Road instead of Folkestone Gardens and Childeric Road instead of Fordham Park.

In a subsequent site visit with a DH contractor, a further option was identified to install the pipe in the soft dig land along the edge of Folkestone Gardens. This would require a small amount of landscaping and the agreement with LBL Parks officers but would be minimally invasive to the park and may provide an alternative to installation in the carriageway or footway if required.

In order to investigate the routing options in more detail, we sourced utilities mapping for the study area and commissioned two days of ground penetrating radar (GPR). The mapping showed that much of the area is heavily congested, including large sections of the *initial preferred route*. Surrey Canal Road and Trundley's Road in particular are heavily congested, including extra high voltage electricity mains and an intermediate pressure gas main. Some areas outside of the *initial preferred route*, however, appear to better-suited to district heating mains installation – particularly Sanford

Street which is less congested with major utilities than Woodpecker Road, which runs parallel to it and significantly wider.

GPR in the south side footway of Surrey Canal Road showed that there appears to be a route through it, making use of the adjoining soft dig verge at points where high voltage electricity cabling is in the footway. It is noted, however, that this route would not be possible without the works area encroaching into the westbound carriageway of Surrey Canal Road and this may be unacceptable to LBL given the necessary duration of the works and the importance of traffic flows along the road.

GPR was also undertaken in the west side footway of Trundley's Road. It showed that there are already a number of existing utilities in the footway and installation of DH pipework would not be possible. As such, further investigations will be necessary to confirm whether a route can be found through the Trundley's Road carriageway.

The presence of the intermediate pressure gas main and high voltage electricity cable in Surrey Canal Road and Trundley's Road mean that hand digging would be the only way to install in these areas. Southern Gas Networks will also need to witness excavation in the vicinity of their intermediate pressure gas main.

Visual assessment and analysis of utilities drawings suggest that mechanical excavation may be possible along the carriageway in Sanford Street; however this should be confirmed with GPR and trial excavations. Sanford Street is sufficiently wide that traffic flows could be maintained during installation with appropriate traffic management.

Childeric Road, which was assessed as an alternative to Fordham Park, is residential with on-street parking. The utilities drawings show a number of utilities through the carriageway, such that a route through for the DH pipework cannot be confirmed without site investigation. Parking bay restrictions will also be required if installation goes ahead.

New Cross Road, which is a TfL red route, requires specific measures to ensure minimum disruption to the heavy volumes of traffic that use it. TfL have specified that, in order to allow the works to proceed, two-way traffic flows must be maintained at all times and working should be limited to off-peak hours. We have identified a preferred crossing point for New Cross Road (Goodwood Road across to St James's), which is also well placed for future connection to two planned developments on Goodwood Road.

In conclusion, we have undertaken a detailed and comprehensive assessment of the routing options for a heat network between SELCHP and Goldsmiths College. We have confirmed that the *initial preferred route* is not feasible through several sections of the route and identified preferred alternatives. We have also liaised with SELCHP and Goldsmiths to confirm routes through their facilities.

It must be emphasised that areas of the preferred route are still uncertain and require further investigation – particularly Surrey Canal Road and Trundley's Road. As a minimum, we recommend additional GPR in the soft dig British Wharf-owned land along Surrey Canal Road, the Trundley's Road carriageway and along Childeric Road. Trial excavations would also be beneficial – particularly along Trundley's Road and Childeric Road, pending the outcome of further GPR.

We would also recommend that LB Lewisham officers are engaged in a working group to discuss key areas and to identify whether, and where, concessions could be made to facilitate the project.

SECTION 1

INTRODUCTION

1 INTRODUCTION

1.1 Scope of study

WSP | Parsons Brinckerhoff were appointed by the London Borough of Lewisham (LBL hereafter) to undertake a feasibility study for a heat network supplying Goldsmiths, University of London (Goldsmiths hereafter) with heat from the SELCHP waste incineration plant. The wider assessment consists of four elements:

Element A: A *route optimisation* study to determine the most effective route between SELCHP and Goldsmith's College;

Element B: A *network expansion* assessment to identify opportunities to establish additional connections to the network;

Element C: A *design* study to identify the technical requirements of the heat network, allowing likely costs to be calculated;

Element D: A *governance and delivery options* study for the heat network.

This report represents the output for Element A. Elements B to D will be delivered in separate reports.

This report assesses the site conditions and practicalities of installing a pipe network between SELCHP and Goldsmiths to determine the preferred route between the two. It forms part of a wider set of documents – the New Cross Heat Network Feasibility Study *Element A Document Package* – which contains the following.

- Route feasibility assessment (this report)
- Archaeological constraints report
- Preliminary ecological appraisal
- Contaminated land report
- Transport infrastructure impact assessment
- Affected utilities drawings
- Ground penetrating radar utilities layout mapping
- Section 50 application pack
- Application for temporary Traffic Management Order
- Routing options map
- Preferred route map

1.2 Report structure

This report will use the *initial preferred route* proposed by LBL during the tender stage as the starting point for our investigation. The *initial preferred route* will be evaluated alongside alternative route options that we have identified in order to identify the preferred heat network route between SELCHP and Goldsmiths.

We will discuss the typical installation requirements of DH infrastructure, which will inform the route selection choices that follow. We will present the findings of several stages of site-based investigations, discussions with LBL departmental officers and utility mapping consultation. We will also record the points of interface with local businesses, housing associations and resident groups along the route.

We will consider the potential for interaction with other developments in the area and highlight any other development proposals that have the potential to impact, or be impacted by, the installation of heat network infrastructure.

We will propose a preferred route based on the results of our investigations and will highlight shortcomings of the assessment and propose next steps. We will also present a financial risk assessment for the route selection and installation based on the outcomes of our analysis.

SECTION 2

DISTRICT HEATING NETWORK DESIGN AND INSTALLATION PRINCIPLES

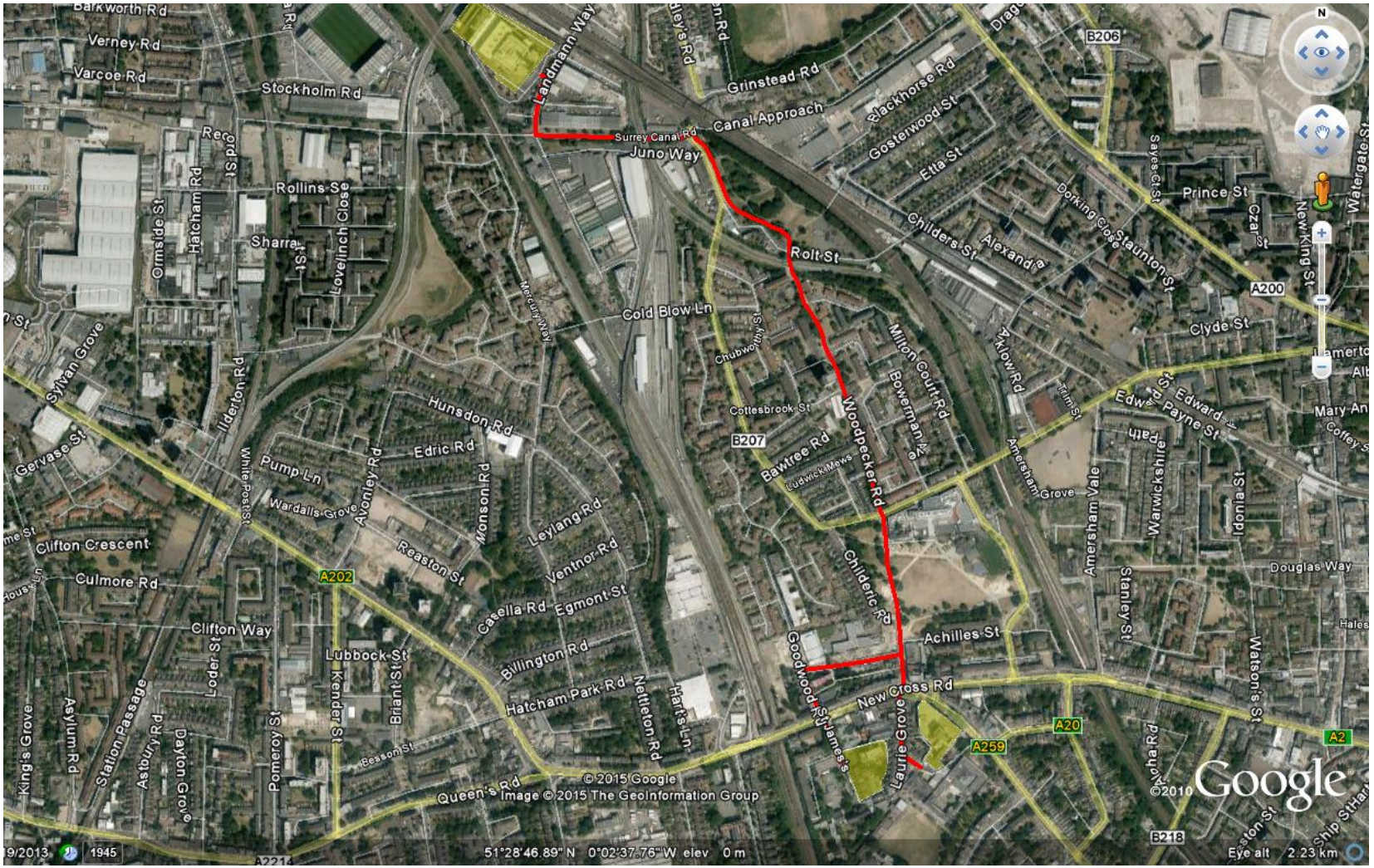
2 DISTRICT HEATING NETWORK DESIGN AND INSTALLATION PRINCIPLES

2.1 Initial preferred route

An initial preferred route has been proposed by LBL, as shown in Figure 2-1. WSP | Parsons Brinckerhoff has undertaken an initial desktop review of the area using Google Earth and we also believe the route proposed by LBL to be the most direct link between SELCHP and Goldsmiths, with minimal interaction with major roads and rail infrastructure.

This route will be the referred to as the *initial preferred route* hereafter and shall be the starting point for our analysis.

Figure 2-1: Initial preferred route between SELCHP and Goldsmith's College



2.2 Typical pipe installation conditions

Installation of district heating pipework is generally versatile. It is typically installed below ground in a friction locked system, wherein the friction material (i.e. backfill material of appropriate specification) within which it is buried applies a friction force to the pipe, limiting the axial stress on the pipe as it expands and contracts under heating and cooling cycles.

Manufacturer guidelines specify that DH pipework should typically be buried at a minimum depth of 500mm to 600mm (depending on the manufacturer). This can be reduced slightly in areas where the pipe will not be installed underneath a carriageway, although shallower installation means there is increased expansion due to the lower friction force applied by the backfill material. Pipe depth can be varied to pass under or over existing utilities; however it can be necessary to use additional protection (e.g. steel plates) in circumstances where the pipe depth is less than manufacturer recommended levels.

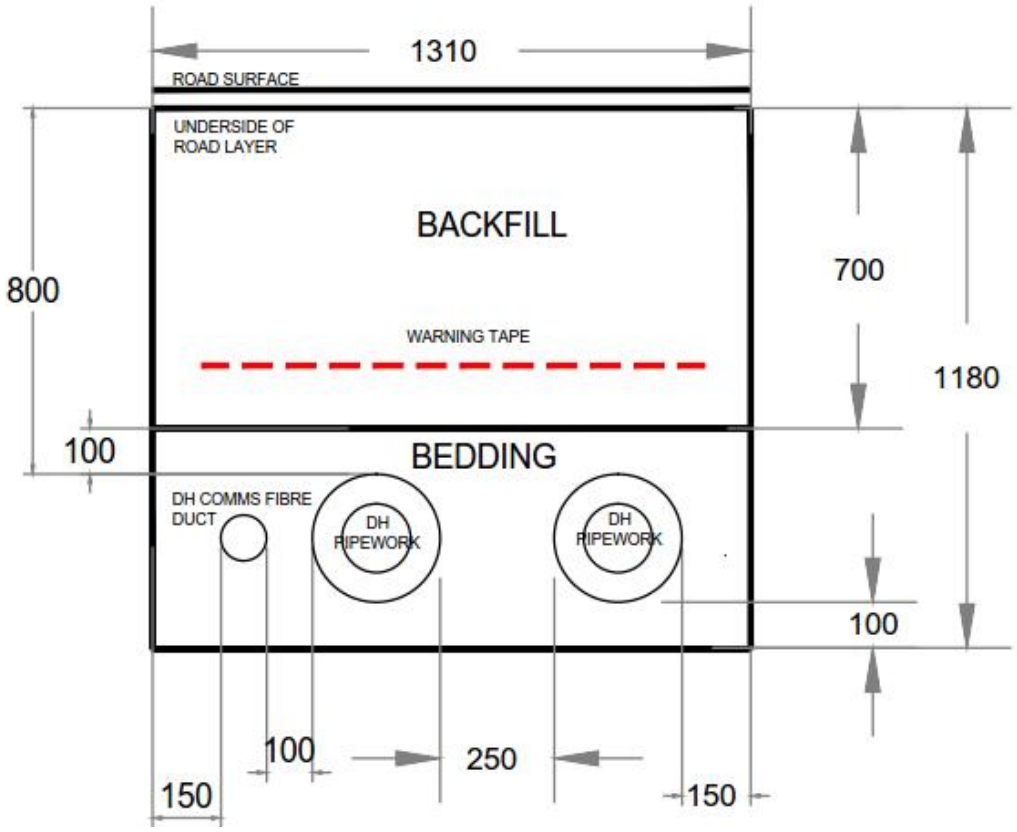
Most DH pipe is comprised of polyurethane foam insulation bonded to a steel 'carrier' pipe. The outer casing is high-density polyethylene. It is available in single pipe, where two separate pre-insulated pipes are used for the flow and return, or twin pipe, where the flow and return carrier pipes are within a single polyethylene casing.

Single pipe is easier to work with in an urban setting because twin-pipe is harder to manipulate in congested areas. Twin pipe is also only available in sizes up to 200mm internal diameter, making it less suited to large heat networks.

Pipework can be buried in hard dig or soft dig ground and it is generally preferable to install in soft dig areas due to the reduced cost of civil engineering works associated with the installation. It should be installed, as much as possible, in areas where it can be accessed readily in the event of a leak.

A typical trench section for installed DH single pipe with a controls cabling duct is shown in Figure 2-2.

Figure 2-2: Typical buried DH single pipe trench section – 150mm internal diameter pipe



DH pipes are typically welded in situ before outer casing joint closures are fitted, which means space is required within the trench for installers to work around the pipe. In addition to the trench width, additional space will be required for a working area. Civils contractors need space to excavate the trench and move spoil away from the area and DH installers need to be able to position pipe alongside the trench, for example using a HIAB, and then to lift it into the trench for installation. As such, although the trench may be around 1 to 1.5 metres in width, the required working area would be much greater during key stages in the installation period. Examples of DH pipe installations are presented in Figure 2-3, Figure 2-4 and
Figure 2-5.

Figure 2-3: DH trench example

Figure 2-4: DH trench example

Figure 2-5: DH trench spoil area

The availability of working space is potentially a significant issue for the proposed heat network, particularly at the start of the route, i.e. Surrey Canal Road and potentially Trundley's Way. These roads are subject to heavy traffic flows with limited available working space (see Section 3.3).

2.3 Pipe sizing

Element B of this feasibility study will focus on the possible extension of the heat network to serve other loads in the vicinity of the proposed pipe route. As such, the pipe diameter cannot be confirmed at this stage; however the size of the pipe is an important factor in when assessing the viability of the scheme.

In conversation with Veolia, they confirmed that they could supply hot water up to 110°C flow with a preferred return temperature of 70°C. It is noted that secondary systems at Goldsmiths have been designed to traditional 82/71°C flow and return temperatures, so the return temperature to a heat network is likely to be around 75°C once the heat is transferred to the primary system via a heat exchanger based on current operating temperatures. It is noted, however, that Goldsmiths advise that they are intending to make improvements on their heating systems to gradually lower their return temperatures. As such, the design of the heat network could be optimised to take account of future improvements in Goldsmiths' returns.

WSP | Parsons Brinckerhoff has calculated the maximum available heat for different pipe sizes based on the following assumptions:

- **Velocity**: 3m/s (based on industry guidelines for maximum flow rates in heat network mains and transmission pipes);
- **Primary temperatures**: 110°C flow and 65°C return

The heat supply capacity of different pipe sizes based on the assumptions above is presented in Table 2-1.

Table 2-1: Heat supply capacity of different pipe sizes at 110/65°C and 3m/s

Pipe diameter (mm)	Heat supply capacity at 110/65°C and 3m/s (MW)
150	10.4
200	19.4
250	30.5

In a meeting with Veolia, operators of the SELCHP plant, it was confirmed that there would be approximately 17MW of heat available for a New Cross Heat Network based on their total available heat and the quantity already supplied to the Southwark Heat Network. Based on that information and the above capacities, a pipe of 200mm diameter would be sufficient to take all of the available heat at the assumed temperature and velocity inputs. If the supply temperature was dropped to 95°C, the available heat from a 200mm pipe with a return temperature of 65°C and a flow velocity of 3m/s would be 13MW.

A further important consideration in the determination of appropriate pipe size is the ability of the connected loads to meet their own peak heat demands. The proposed heat network will not offer resilience of supply in the form of back-up plant (i.e. boilers). As such, all connected loads shall be required to maintain their own on-site heat supply capacity and it is therefore not a requirement of the heat network that it is sized to meet peak loads at each of the connected buildings.

The final selection of pipe size should be a product of a number of factors:

- Practicalities of installing the pipework
- Availability of on-site back-up heat supply
- Heat loads at connected buildings
- Impact of the quantity of heat off-take on the heat price from Veolia.

Of these contributing factors, the last two will be investigated during the later elements of this feasibility process. The heat network will not be required to meet peak demands at Goldsmiths due to the availability of on-site boilers, so it can be concluded at this stage that there is some flexibility in the sizing of the heat network, should the practicalities of installing the pipework require a smaller pipe and pending the outcome of commercial discussions with Veolia.

SECTION 3

ROUTE SITE SURVEY

3 ROUTE SITE SURVEY

Following analysis of the utilities drawings, WSP | Parsons Brinckerhoff visited the site to undertake a visual assessment of the initial preferred route. The purpose of this assessment was to inspect the route as well as any alternative options and identify any above ground obstacles and interfaces that should be considered during the construction planning phase.

3.1 Alternative routes considered

Several alternative routes were considered in addition to the preferred route. The alternatives were considered as a means of overcoming potentially difficult elements of the preferred route (these are discussed more in Section 3.2).

A summary of the assessed routes and their benefits is presented in Table 3-1. This can be cross-referenced with the *Routing Options* map (*3514033A-M002*), which is provided in the New Cross Heat Network Feasibility Study *Element A Document Package* along with this report..

Table 3-1: Routing options assessed

Option ID	Route	Description	Section ID path in drawing 3513044A-M002	Approximate trench length (m)
A	Initial proposed	As proposed at tender stage	1 - 10	1600
B	Avoiding Surrey Canal Road	Turns right out of SELCHP and left up Mercury Way	1 11 - 15 6 - 10	1660
C	Avoiding Woodpecker Road	Routes down Sanford Road instead of Woodpecker Road	1 - 2 19 14 16 7 - 10	1700
D	Avoiding narrow section of Woodpecker Road	Uses Ludwick Mews to cut out narrowest section of Woodpecker Road	1 - 5 17 7 - 10	1685
E	Avoiding Fordham Park	Goes down Childeric Road to side of Fordham Park	1 - 6 18 8 - 10	1710
F	Alternative crossing point for New Cross Road	Goes down Batavia Road and crosses New Cross Road at Goodwood Road and St James' rather than Clifton Rise and Laurie Grove.	1 - 8 20 - 21	1820

Note that within these options there are further permutations, for example option C and option E could be combined.

3.2 Visual route assessment

WSP | Parsons Brinckerhoff made multiple site visits, including with members of LBL's Parks, Cycle Programme and Tree teams and a civil engineering contractor and a district heating contractor, noting

key characteristics and elements of difficulty for each section and discussing the merits of each potential routing option. A summary of observations during this process is presented in Table 3-2.

Note that the section IDs in Table 3-2 correspond to the sections in the *Routing Options* map (*3514033A-M002*) and as referred to in Table 3-1.

Table 3-2: Site survey assessment summary

Section ID	Name	Notes	Potential disruption / engineering difficulty	Specific reinstatement required?
OPTION A: INITIAL PROPOSED ROUTE				
1	Route within SELCHP out to Surrey Canal Road	Pipe attached to internal SELCHP access route and exits facility through waste recycling works centre	Proposed exit point onto Surrey Canal Road potentially complicated.	No
2	Surrey Canal Road	Heavy traffic flow. Raised cycle path on north side, narrow pavement on south side. Junction with Trundleys Rd also very busy.	1: Installation in road highly disruptive. 2: Must pass under railway bridge. 3: SCR-Trundleys Rd junction is very busy. 4: Cycle path is part of a major cycle infrastructure redevelopment, which will be completed this year. Politically sensitive and expensive to reinstate. 5. Limited working space.	Yes
3	Folkestone Gardens	Existing footpath likely to be preferred route with some soft dig towards south end of the park.	1: Changes in elevation. 2: Lots of trees. 3: Also part of new cycle route. Politically sensitive and expensive to reinstate.	Yes
4	Woodpecker Road railway bridge	Pedestrian/cycle route passing under raised railway bridge.	1: Possibly reinforced concrete under bridge. 2: Heavy scarring suggests multiple existing buried services.	Possible
5	Woodpecker Road	Pedestrian/cycle route. Narrows through southern section towards Edward St. Multiple 'scars' from other services.	1: Heavy scarring suggests multiple existing buried services. 2: Narrow in places - likely hand dig.	Possible
6	Edward Street crossing	Pedestrian crossing over fairly busy road.	1: Traffic management required. 2: Bus route.	No
7	Clifton Rise / Fordham Park	Pedestrian/cycle route through park.	Newly laid pedestrian/cycle route. Reinstatement would be expensive and unpopular within Council.	Yes
8	Clifton Rise	Side street off New Cross Road. Low traffic flow. Several shops/businsses on each side.	Change in elevation.	No
9	New Cross Road	Large arterial route. Heavy traffic and heavy pedestrian usage. Central reservation in the moddle.	1: Installation in road highly disruptive. 2: TfL red route. 3: Central trief kerb between Clifton Rise and Laurie Grove. 4: Likely to contain multiple other buried services.	No
10	Laurie Grove	Residential street approaching Goldsmiths College.	Nothing apparent.	No
SECTIONS FOR OPTION B - AVOIDING SURREY CANAL ROAD				
11	Surrey Canal Road (heading west)	Heavy traffic flow. Raised cycle path on north side, narrow pavement on south side. Junction with Trundleys Rd also very busy.	1: Installation in road highly disruptive. 2: Must pass under railway bridge. Potential structural implications. 3: Still some requirement for installation in cycle path.	No
12	Mercury Way	Runs through residential area with several industrial businesses off to the left.	Installation likely to block access to Economic Skips Ltd and Goodwood Asphalt	No
13	Cold Blow Lane	Narrow road under two railway bridges.	1: Narrow road would require full road closure. 2: Passes under two railway bridges. Possibly reinforced concrete. 3: Scarring suggests existing buried services in narrow section of road.	No
14	Sanford Street	Larger road running parallel to Woodpecker Road	1: Traffic management required. 2: Bus route.	No
15	Cottesbrook Street	Side street through housing estate. Residential access only.	Nothing apparent.	No
SECTIONS FOR OPTION C - AVOIDING WOODPECKER ROAD				
16 & 19	Sanford Street and Trundley's Road	Main road through residential area.	1: Traffic management required. 2: Bus route. 3. Scarring suggests multiple existing buried services.	No
SECTIONS FOR OPTION D - AVOIDING NARROW SECTION OF WOODPECKER ROAD				
17	Ludwick Mews	Side street through residential development - Lewisham owned	Not black-topped. May require bespoke reinstatement.	Yes
SECTIONS FOR OPTION E - AVOIDING FORDHAM PARK				
18	Childeric Road	Residential street at side of Fordham Park.	1: Disruption for local residents. 2: Parking bay restrictions.	No
SECTIONS FOR OPTION F - ALTERNATIVE CROSSING POINT FOR NEW CROSS ROAD				
20	Batavia Road	Road through new development and possible future heat load.	1: Disruption for local residents. 2: Specialist reinstatement likely.	Yes
21	Goodwood Road	Residential street north of New Cross Road	1: Disruption for local residents and businesses. 2: Parking bay restrictions.	No

3.3 Discussion of options – points of engineering difficulty

Based on the site surveying, there are several potential areas of engineering difficulty along the initial preferred route, as highlighted in the assessment summary (Table 3-2). These areas are discussed in more detail below.

3.3.1 *Surrey Canal Road*

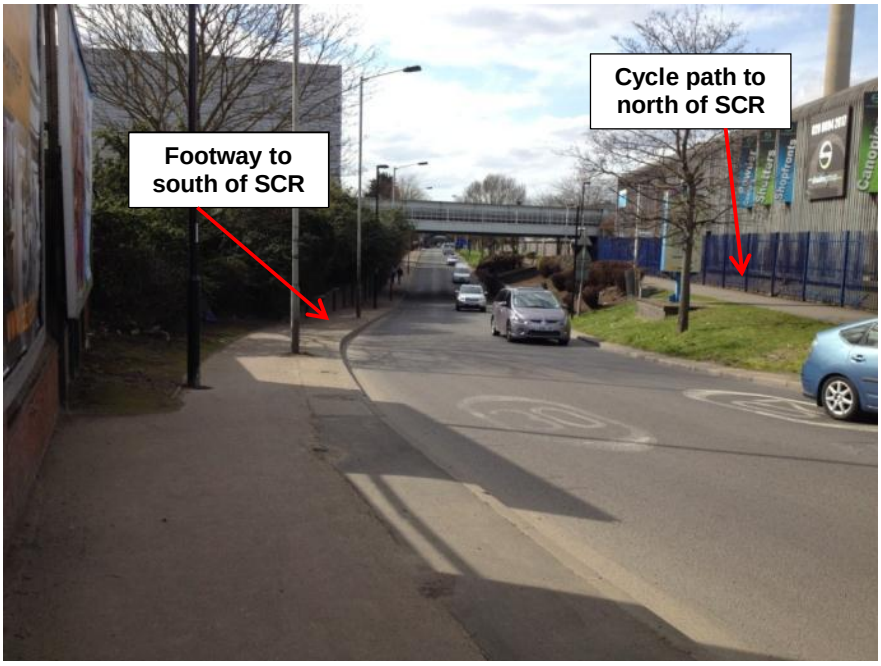
Surrey Canal Road runs east-west along the front of the SELCHP site. The road has a very high traffic flow and is strategically important as it provides the only point of entry for refuse vehicles entering SELCHP itself. Figure 3-1 shows the junction of Trundley's Road and Surrey Canal Road. The picture was taken in the middle of a working day and illustrates the heavy traffic flows through this area and the comparative narrowness of this road.

Figure 3-1: Junction of Surrey Canal Road and Trundley's Road (taken from Trundley's Road)

In discussion with LBL Highways Network Management officers, it was noted that the Surrey Canal Road carriageway should not be closed at any time and that installing the pipe through the carriageway would not be possible. WSP | Parsons Brinckerhoff therefore considered alternatives, as follows and as shown in Figure 3-2.

1) Install the pipe in the footway to the south of Surrey Canal Road;
2) Install the pipe in the cycle path to the north of Surrey Canal Road.

Figure 3-2: Surrey Canal Road



Cycle path north of Surrey Canal Road

Assessment of the utilities drawings discussed in Section 4.1 shows that there are multiple buried utilities already running through the cycle path along Surrey Canal Road, including an Extra High Voltage (EHV) UK Power Networks electricity main. The utilities companies with apparatus in the Surrey Canal Road cycle path are:

- Interoute: fibre-optic cable
- BT: telecoms
- UKPN: EHV electricity cable
- Thames Water: water mains (300mm)
- Southern Gas Networks (LP gas main)

WSP | Parsons Brinckerhoff discussed the potential use of the cycle path with an LBL Cycle Programme officer, who advised that it is soon to undergo significant regeneration involving complete resurfacing of the path with bonded gravel. The works are programmed to begin imminently and LBL advise that, once completed, any excavation to install district heating mains would require the whole width of the cycle path to be resurfaced with bonded gravel, rather than the width of the trench only. This would make reinstatement considerably more expensive (we estimate an additional £100k based on costs for bonded gravel provided by LBL and the cycle path area). We were also advised that these works have the support of the Mayor's office, so closing the cycle route to install DH pipework would be politically sensitive and likely to be met with strong objection from cycling communities. It was therefore agreed that it should be avoided unless there is no alternative.

Figure 3-3: Cycle path to north of Surrey Canal Road

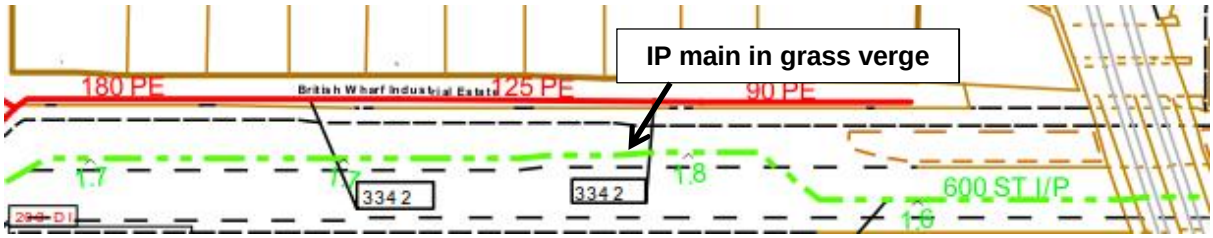
It is noted that there is a soft dig area on either side of the cycle path, either of which may provide a means of minimising the requirement for excavating it. These areas start to the west of the railway bridge and are shown in Figure 3-4.

Figure 3-4: Surrey Canal cycle path – west of railway bridge (looking towards SELCHP)

The soft dig areas offer a potential alternative to installation within the cycle path itself. The area nearest the road is owned by LB Lewisham and the area to the north is privately owned by British Wharf Industrial Estate, whose property backs onto the cycle path (British Wharf is visible to the right in Figure 3-4).

Upon consulting the utilities mapping, we identified that the LBL-owned area nearest the road contains a number of mature trees and an Intermediate Pressure (IP) gas main, which effectively rules out the possibility of installing in this area.

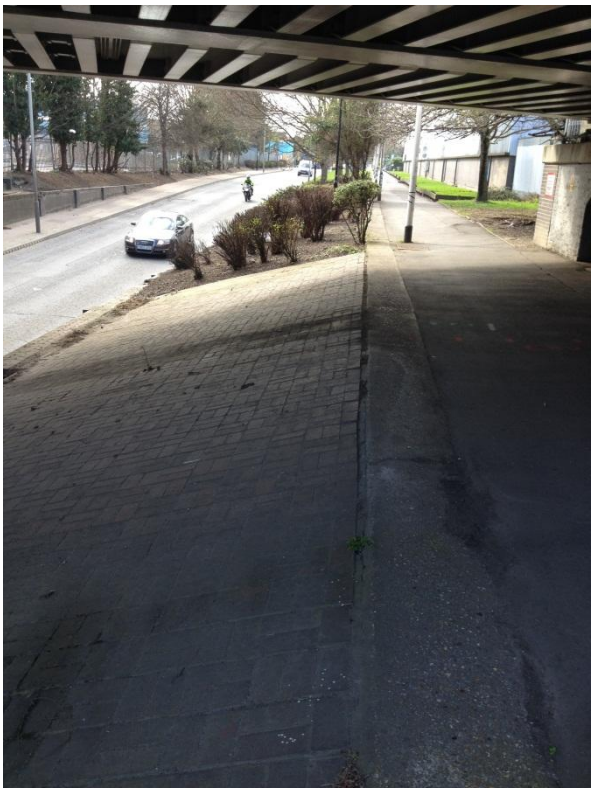
Figure 3-5: Gas infrastructure along Surrey Canal Road (Southern Gas Networks mapping)



The British Wharf land to the north of the cycle path is flat, there are no trees and there appear to be fewer utilities through the area (utilities drawings shows BT and low pressure gas mains); however a wayleave would be required as the land is not owned by LBL. It is also noted that this area ends at the railway bridge. There is an area of land on the other side of the cycle path that passes under the railway bridge and that would enable the pipe to continue along SCR, primarily outside of the cycle path (the pipe would have to cross the cycle path) but on the north side of the road. It was initially thought that this area would not be suitable on the basis that it is on a slope and part of it is paved with road bricks; however when we attended site with the DH contractor, he felt that installation through this area would be possible and that reinstatement could be to a higher standard than is currently the case, bringing a benefit to the Council. There is a manhole in the middle of this area, however the utilities mapping shows that the water main underneath does not run through the area, just across it.

Figure 3-6 shows the area between the carriageway and the cycle path going under the railway bridge to the east of SCR.

Figure 3-6: Raised area under SCR railway bridge



If the pipe is routed along the north side of the road, i.e. in the British Wharf land or the cycleway, it will be necessary to cross Surrey Canal Road at some point in order to head south into Folkestone Gardens or down Trundley's Road. The first choice for doing so would be by going under the carriageway. On a site visit with project team members, the possibility of using the London Overground bridge structure to cross the road without disturbing the carriageway was discussed and, although this remains a possibility, we propose that there are several issues with this approach:

1) Pipe would rise up the bridge structure, meaning it could be exposed to accidental damage or vandalism. The pipes will contain water at up to 110°C, so this approach carries a risk of injury and any such damage could have severe consequences;
2) Network Rail and TfL own the bridge and would require structural assessment of the impact on the bridge
3) Attaching the pipe to the underside of the bridge would reduce the clearance between the carriageway and the bridge, which is particularly important in this area as it is the main access route for refuse vehicles going to SELCHP.

Figure 3-7: Underside of Surrey Canal Bridge structure

For these reasons, it is concluded that it would be preferable to cross Surry Canal Road in the carriageway.

Footway to the south of Surrey Canal Road

It is not clear from the utilities drawings (see Section 4.1.1) which services are buried in the south side footway; however it would appear that there are one, possibly two, extra high voltage electricity cables in this vicinity as well as telecoms and fibre-optic cable.

The presence of other utilities, and particularly EHV electricity cables, potentially makes installation in the south side footway very difficult; however upon site inspection (it is not clear from the UKPN utilities drawings), it is noted from the presence of markers (see Figure 3-8) that one EHV cable runs through the verge to the right of the footway for some of the length of Surrey Canal Road. There are no markers in the verge at the SELCHP end of the footpath, so the EHV cable may be in the footway at this point.

Figure 3-8: Electricity cable position markers in the verge on the south side of Surrey Canal Road

WSP | Parsons Brinckerhoff commissioned ground penetrating radar for the south side footway in order to determine the position of services through this area. The results of this are discussed in Section 4.2.

If the pipe were to be installed in the south side footway, it would be necessary to encroach to some extent into the carriageway. As described in Section 2.2, the working area for the installation would be considerably greater than the width of the trench itself, meaning it would not be possible to limit the extent of the works area to the footpath only.

We contacted LBL Network Management officers to discuss the installation and confirm their position on using traffic management during the installation period. The Network Management officer commented that it is likely to be possible to encroach into the carriageway where necessary, pending approval of the proposed traffic management measures, however it should be minimised.

We also note the requirement to cross Surrey Canal Road with the pipework in order to get from the SELCHP facility, which is on the north side of the road, to the south side footway. This is more intrusive as it involves installing pipe in the carriageway across the width of the road. Crossing Surrey Canal Road at some point is unavoidable, however the impact of this should be minimised by working out of hours and using road plates to facilitate traffic flow as necessary. The requirement to work in the carriageway across a short section was also raised with LBL Network Management officers, who responded to say that agreement could, in all likelihood, be reached on dates, times and methods.

Route Option B in Table 3-2 presents an alternative route, avoiding the requirement to install along Surrey Canal Road by going up Mercury Way and cutting across Cold Blow Lane. This option would be damaging to the future expansion capacity of the network as there is considerable additional load located to the east of Surrey Canal Road. Future network expansion is the subject of *Element B* of this study; however it is noted here that there are three Strategic Site Allocations – Convoys Wharf, Plough Way and Oxestalls – all of which are located to the east of Surrey Canal Road. It is also the case that Route Option B would require installation through two railway bridges on Cold Blow Lane, one of which is single lane carriageway, as shown in Figure 3-9, and contains several existing utilities. As such, it is concluded that Route Option B would be both technically difficult to install and strategically damaging to the future potential of the scheme and should therefore be avoided.

Figure 3-9: Single lane carriageway through railway tunnel on Cold Blow Lane

3.3.2 *Exit from SELCHP site*

The route within the SELCHP site is discussed in Section 5.1; however the pipe route immediately outside the SELCHP facility is particularly important as it has the potential to be a complicated installation.

SELCHP have stated the intention to route the pipe along the underside of the road bridge leading into the facility. The pipe will then pass through the LBL-owned Waste Reception Centre and out onto Surrey Canal Road, as shown in Figure 3-10.

Figure 3-10: Proposed route off SELCHP site through Waste Reception Centre

The point at which SELCHP's proposed route exits out on Surrey Canal Road is shown in Figure 3-11, as indicated with the 'X'.

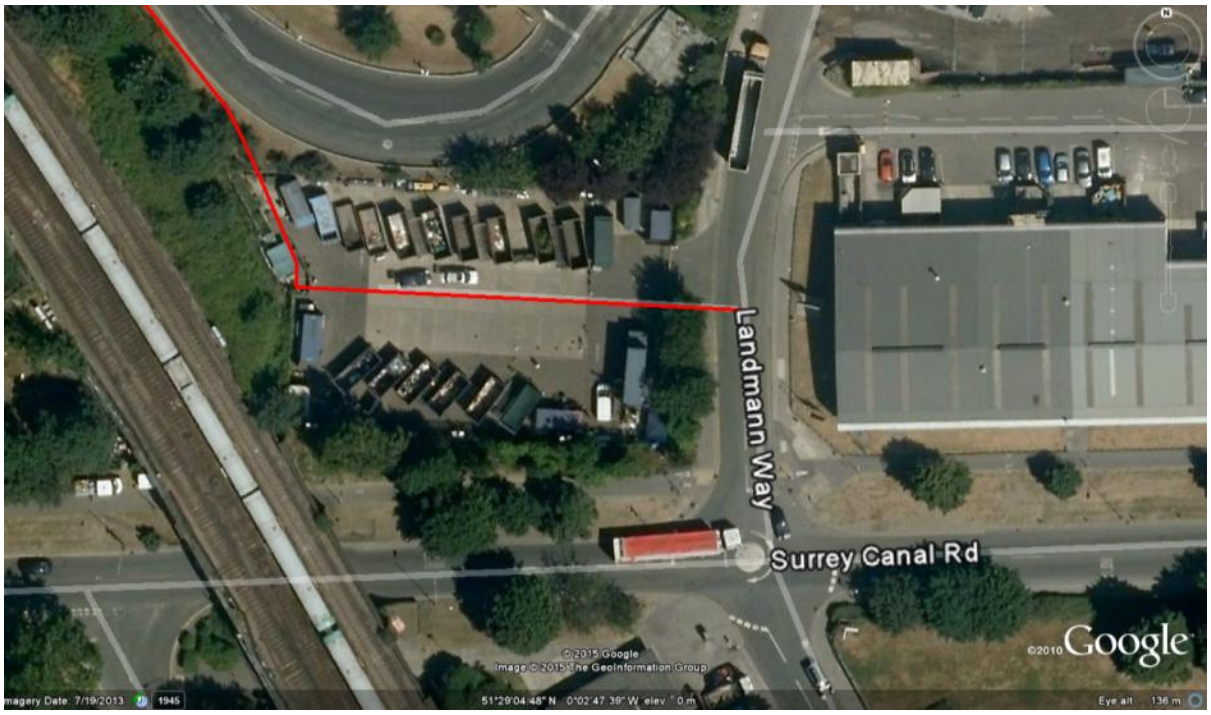
Figure 3-11: SELCHP proposed route off site exit point onto Surrey Canal Road – looking west

Exiting onto Surrey Canal Road at this point brings about a number of installation difficulties:

1) It would not be possible to go directly across to the south side footway as it is elevated, with a retaining wall between the cycle path and the carriageway.
2) The embankment in the foreground of the picture is elevated relative to the road with a tree in the middle of it.
3) It may be possible to route along the cycle path as the embankment levels out towards Landmann Way; however this would mean digging up more of the new cycle route.

All of these factors make installation around this section more complicated. It is therefore proposed that it would be easier to route east through the Waste Reception Centre and out onto Landmann Way, where the pipe can cross Surrey Canal Road, as shown in Figure 3-12.

Figure 3-12: Proposed alternative route off SELCHP site through Waste Reception Centre gates



WSP | Parsons Brinckerhoff contacted the Strategic Waste and Environment Manager at LBL to discuss the possible route through the Waste Reception Centre and they confirmed that this should be feasible as long as provision is made (by the Council) for alternative waste disposal facilities for the duration of the period through which the facility is closed. They also requested that the two fish ponds on the site are not affected by the pipe route.

3.3.3 *Woodpecker Road*

Woodpecker Road is attractive as a pipe routing option as it is a pedestrian and cycle route which runs north-south for much of the distance between SELCHP and Goldsmiths. However, following site inspection, it is clear that it contains multiple other buried services. Assessment of utilities drawings (discussed in more detail in Section 4.1) confirms that this is the case and that one of the existing services is an intermediate pressure (IP) gas main.

The narrowest point of Woodpecker Road is at the southernmost end, immediately north of the Edward Street pedestrian crossing. Figure 3-13 shows the extent of the reinstatement works from other service installations at this point.

Figure 3-13: Southern end of Woodpecker Road - scarring from other utility installations

The route widens as it moves north, which would make installation easier. As such, the area of greatest engineering difficulty is at the south end of Woodpecker Road.

WSP | Parsons Brinckerhoff assessed alternatives to Woodpecker Road. The first option would be to avoid it altogether by installing the mains in Sanford Street (Route C in Table 3-1). Alternatively, if installation is possible through the wider end of Woodpecker Road to the north, a second option would be to use Ludwick Mews, which runs parallel to the south section of Woodpecker Road, as shown in green on
Figure 3-14.

Figure 3-14: Alternative route (green) avoiding southernmost end of Woodpecker Road via Ludwick Mews

Ludwick Mews is owned by LBL and analysis of the utilities surveys shows that there are fewer services in the road through this section[1].

It is noted that the diversion around Ludwick Mews is 85m longer than the more direct route through Woodpecker Road; however it does provide an alternative if required.

3.3.4 Folkestone Gardens and Fordham Park

The initial preferred route utilises Folkestone Gardens and Fordham Park as a means of minimising the requirement for installation in the carriageways. In a site meeting with LBL Parks, Trees and Cycle Programme officers, the following points were raised:

- Folkestone Gardens is also being redeveloped as part of the new cycle route and should be avoided.
- Any soft dig areas in Folkestone Gardens have extensive tree coverage, making a route through very difficult.
- Fordham Park has recently undergone a programme of regeneration. The path running through the middle is of bonded gravel and reinstatement must be to the same standard.

[1] The utility providers with apparatus in Ludiwck Mews are:
- BT: telecoms
- Thames Water: water main (90mm)
- UKPN: LV electricity cable
- Southern Gas Networks: Low pressure gas main (100mm)

It was therefore concluded that installation of DH mains through Folkestone Gardens and Fordham Park would involve significant excavation of recently regenerated public spaces, which would be unpopular, and alternatives should therefore be sought.

WSP | Parsons Brinckerhoff considered alternatives to routing the pipe through Folkestone Gardens and Fordham Park. Trundley's Road is the obvious alternative to Folkestone Gardens. As shown in Figure 3-15, it runs parallel to the park and is easily accessible for either Sanford Street or Woodpecker Road.

Figure 3-15: Area around Folkestone Gardens, including Trundley's Road

Fordham Park can be avoided by routing down Childeric Road, directly west of the park. This would provide a more direct route between SELCHP and Goldsmiths if Woodpecker Road is not used, as shown in
Figure 3-16.

Figure 3-16: Alternative route avoiding Fordham Park via Childeric Road

With regard to Folestone Gardens, subsequent to the site meeting with LBL Parks and Cycle Programme officers, WSP | PB visited site with a DH contractor and they noted that, should it not be possible to install the pipes in the carriageway or footway on Trundley's Road, it would be possible to install in the soft dig land at the very edge of the park, next to the footway. They highlighted that this could be done in such a way that it wouldn't affect the paths and (future) cycle way and would be largely soft dig and therefore cheaper than going through Trundley's Road. The proposed location is at the bottom of a steep embankment and it was noted that this embankment may need to be re-profiled as part of the works, but as long as this was acceptable, the installation would be possible.

The area proposed for installation by the DH contractor is shown in Figure 3-17.

Figure 3-17: Proposed area for pipe installation to the edge of Folkestone Gardens (looking towards Sanford Street)

The viability of installing in Trundley's Road carriageway or footway is discussed further in Section 4.1.2

3.3.5 *New Cross Road*

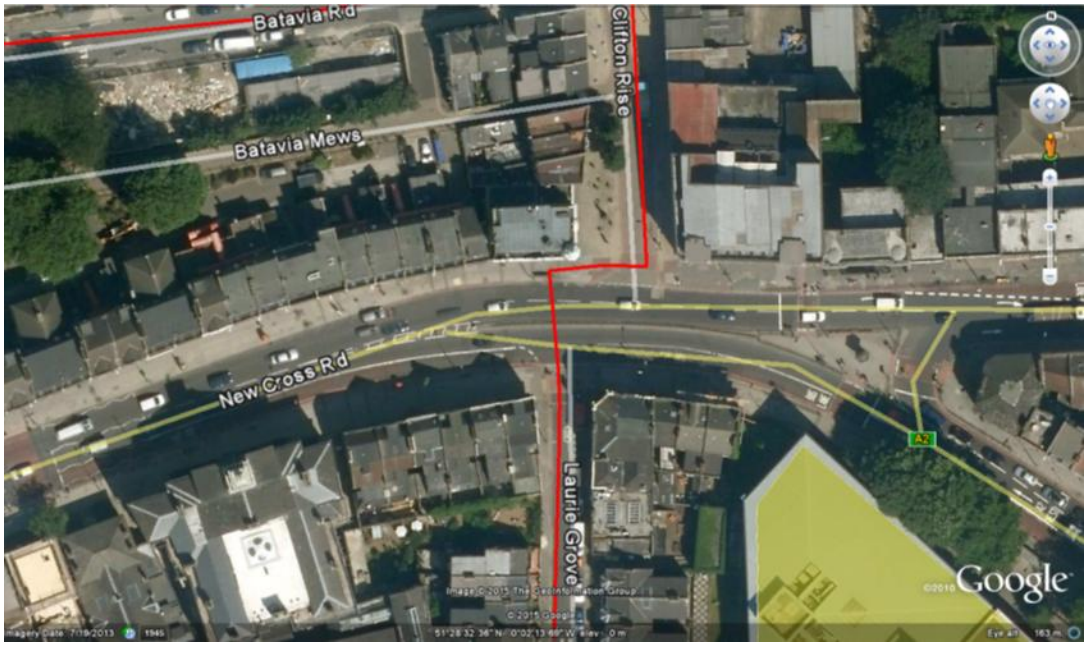
New Cross Road runs along the front of Goldsmith's College. It is a TfL red route and contains a significant number of buried services (see Section 0).

WSP | Parsons Brinckerhoff has liaised with TfL regarding the installation of DH pipe in the road and a full description of this process and the outcomes can be found in the *Transport infrastructure impact assessment* report provided in the New Cross Heat Network Feasibility Study *Element A Document Package* along with this report

In summary, however, TfL would require two-way traffic flow to be maintained at all times and off-peak and night time working should be used as much as possible to minimise the impact of the works. They must be consulted with an installation methodology and traffic management plan prior to providing consent for the works and there is a daily lane rental charge of £800 for working within specified hours (detailed in the *Transport infrastructure impact assessment* report).

The initial preferred route crosses New Cross Road directly opposite Laurie Grove at the point shown in Figure 3-18. The road at this point is approximately 15m wide.

Figure 3-18: Proposed New Cross Road crossing



Upon visiting site, it was noted that there is a central trief kerb island in New Cross Road between Clifton Rise and Laurie Grove, as shown in Figure 3-19.

Figure 3-19: Central trief kerb on New Cross Road

It may be possible to cut the kerb back to allow for installation; however this would entail more working in an area where TfL require disruption and the duration of installation to be minimised. It would also make traffic management more complicated. As such, an alternative position for crossing New Cross Road has been identified.

Figure 3-20 shows a route across New Cross Road from Goodwood Road to St James's, which is in the Goldsmiths campus and would provide access to the connection points within the College (see Section 5.2). This approach – Route Option F in Table 3-1 – adds approximately 220m to the network length; however the width of New Cross Road at this point is 12m (3m narrower than at Clifton Rise to Laurie Grove) and there is no central trief kerb, which will save on installation time and cost within the carriageway itself.

It is also the case that there are two potential future connections on Goodwood Road: Bond House, which is being redeveloped; and the Goodwood Road development to the east of New Cross Gate train station. Routing down Goodwood Road therefore ensures the network is in close proximity to potential future connections and reduces the time spent working in New Cross Road.

Goodwood Road is therefore considered to be a preferable position for crossing New Cross Road.

Figure 3-20: Alternative crossing point for New Cross Road – Goodwood Road to St James's

SECTION 4

UTILITIES SURVEYING

4 UTILITIES SURVEYING

4.1 Utilities drawings

A full set of utilities drawings has been sourced so as to identify the position of other buried services in the vicinity of the initial preferred route and surrounding area. The utilities drawings are presented in the New Cross Heat Network Feasibility Study *Element A Document Package* along with this report.

WSP | Parsons Brinckerhoff has analysed the utilities drawings and a summary of the utility companies with apparatus in the vicinity of the preferred route is presented in Table 4-1.

Table 4-1: Existing utilities in the vicinity of the initial preferred heat network route

Company	Utility Type	Points of interface with initial proposed route	Depth indicated?
BT	Telecoms	Whole route except Folkestone Gardens	No
EU Networks	Fibre-optic data cables	Edward St	No
Instalcom	Telecoms	Surrey Canal Rd, Trundleys Rd, Edward St	350mm footpath / 600m carriageway
Interoute	Fibre-optic data cables	Surrey Canal Rd, Trundleys Rd, Edward St, New Cross Rd	No
National Grid	Electricity transmission cables	Surrey Canal Rd	No
Southern Gas Networks	Gas mains	Whole route, including IP main	No
SSE	Telecoms	Surrey Canal Rd, Trundleys Rd, Edward St	450mm footpath / 600mm carriageway
Thames Water	Water mains	Whole route except Folkestone Gardens	900mm
Thames Water	Sewers	Whole route	Varies
UKPN	Electricity transmission cables	Whole route except Folkestone Gardens	600mm footpath / 750mm carriageway
Virgin Media	Telecoms	Whole route except Folkestone Gardens	No
Vodaphone	Telecoms	Edward St, New Cross Rd	No
Zayo	Fibre-optic data cables	Surrey Canal Rd, Trundleys Rd, Edward St	350mm footpath / 600m carriageway

Of the various interface points, there are several areas where the positioning and/or number of existing services appear to have an impact on the routing. They are:

- **Surrey Canal Road**: multiple services in the road, the cycle path and the south side footway
- **Trundley's Road**: multiple services in the footway and carriageway
- **Woodpecker Road**: multiple services through a small area, including IP gas main
- **Fordham Park**: IP gas main runs through a section of the park in the initial preferred route
- **New Cross Road**: multiple services, including two large trunk sewers, although these are at depth.

4.1.1 Surrey Canal Road

The section of Surrey Canal Road through which pipework would be installed is approximately 250 metres in length. The utilities drawings show that a large number of existing services have been installed in the carriageway, footways, cycle way and the grass verge adjacent to the north side of the carriageway.

The services installed in the cycle way are:

- Southern Gas Networks: low pressure (LP) gas main
- UK Power Networks: Extra High Voltage (EHV) electricity cable
- Virgin Media: Telecoms

The services installed in the grass verge between the cycleway and the carriageway are:

- Thames Water: Water mains

- Southern Gas Networks: intermediate pressure (IP) gas main

The services installed in the carriageway are:

- Southern Gas Networks: IP gas main
- National Grid: Electricity transmission cables

The following services are either installed in the south side footway or the carriageway (it is not clear from the utilities drawings):

- UK Power Networks: EHV cable
- Thames Water: sewer

The following services are installed somewhere within Surrey Canal Road (it is not clear from the utilities drawings):

- Instalcom: Telecoms
- Interoute: Fibre-optic cable
- SSE: Telecoms
- Zayo: Fibre-optic cables

WSP | Parsons Brinckerhoff commissioned GPR surveying in the south side footway of Surrey Canal Road to confirm the position of existing services. The results of this surveying are discussed in Section 4.2.

4.1.2 Trundley's Road

Trundley's Road is not included in the initial preferred route as it was anticipated that the pipe would be installed in Folkestone Gardens. Section 3.3.4 highlighted issues with installing the pipe through the park and proposed Trundley's Road as an alternative.

Assessment of the utilities drawings shows that there are multiple existing services in Trundley's Road. They are:

- BT: Telecoms
- Instalcom: Telecoms
- Interoute: Fibre-optic cable
- Southern Gas Networks: LP and IP gas mains
- SSE: Telecoms
- Thames Water: sewer
- Thames Water: water mains
- UK Power Networks: HV and EHV electricity cable
- Virgin Media: Telecoms
- Zayo: Fibre-optic cables

It is clear from the mapping that Trundley's Road is already extremely congested with utilities and that finding a route through for DH infrastructure is likely to be difficult. WSP | Parsons Brinckerhoff have commissioned GPR surveying in the footway to the west of the carriageway as this is a continuation of the south side footway on Surrey Canal Road. The results of this surveying are discussed in Section 4.2.

4.1.3 Woodpecker Road

One of the biggest obstacles to the initial preferred route is the fact that there is an intermediate pressure (IP) gas main running along the majority of the route. The gas main passes along Surrey Canal Road (in the carriageway), down Trundley's Road, along the full length of Woodpecker Road and into Fordham Park.

WSP | Parsons Brinckerhoff have contacted Southern Gas Networks, who own and operate the IP gas main, to discuss the heat network and determine their requirements for installing infrastructure and working close to IP gas mains. They responded and specified the following:

1) There should be no mechanical excavation above or within **3m** of the intermediate pressure system.
2) A minimum clearance of 600mm or 1.5 times the external diameter of the gas pipe, whichever is greater, must be maintained. The minimum distance from the IP gas main would therefore be 900mm.

Woodpecker Road ranges in width between approximately 3 and 5 metres. With a minimum clearance of 900mm from the IP gas main for the installation of new services – which effectively reduces the useable width of the road – and a minimum of 3 metres clearance for mechanical excavation, it is concluded that installation would need to be hand dig only. Given the number of other services through Woodpecker Road (see Section 3.3.3), installation would be a long and expensive undertaking. As a result, alternatives have been considered.

Option C in Table 3-1 and accompanying map *3514033A-M002* presents an alternative route, avoiding Woodpecker Road by routing down Sanford Street, which runs parallel to it. The initial preferred route avoided Sanford Street as it is carriageway and therefore less attractive than a pedestrian/cycle route due to the potential for disruption to traffic flows and cost of reinstatement. However the number, size and type of buried services within Woodpecker Road make it far more complex an installation than originally thought. Sanford Street is a comparatively wide road with wide verges to one side, so there is more room for installation, and traffic management would ensure that one side of the road remains open at all times. There may be an opportunity to install the pipe within the footway or the grass verge, although it is noted that there appears from the utilities drawings to be a number of services already installed in the footway to the west of the road. The other services installed in Sanford Street are:

- BT: telecoms
- EU network: fibre-optic cable
- Instalcom: telecoms
- Interoute: fibre-optic cables
- Thames Water: water main
- Vodaphone: telecoms
- UK Power Networks: HV and LV electricity cable
- Zayo: fibre-optic cable

The size of the road and the nature and distribution of the existing utilities are important in comparing Sanford Street to Woodpecker Road. The majority of services in Sanford Street are fibre-optic or telecommunications cables, which are smaller in diameter than sewers, gas mains and water mains. The utilities drawings indicate that most of them are installed in the footway or grass verge to the west of the carriageway, although some of the electrical cabling and the local water main are shown in the footway to the east of the carriageway. It is therefore proposed that routing down the carriageway in Sanford Street would be preferable to Woodpecker Road.

The use of Sanford Street would also complement the option of routing through the edge of Folkestone Gardens (see Section 3.3.4) as it would not be necessary to install round to the southern end of the park. The extent of installation in the park would be minimised. It would still be necessary to cross Trundley's Road, through which an IP gas main and multiple other services are installed.

4.1.4 Fordham Park / Childeric Road

The 600mm IP gas main runs out of Woodpecker Road and into Fordham Park. LBL Parks officers have requested that the route avoids excavating through the recently remodelled park and proposed Childeric Road as an alternative.

Childeric Road is a quiet, residential street. Analysis of the utilities drawings shows that there are a number of existing services buried in the road. They are:

- BT: telecoms
- Interoute: fibre-optic cables
- Southern Gas Networks: LP gas main
- UK Power Networks: LV electricity cable
- Thames Water: water main
- Thames Water: 2 x local sewers & 2 x low level trunk sewers (below 5 metres invert level)
- Virgin Media: telecoms

Although there are multiple services in Childeric Road, the width of the road and the type of services suggests that there may be a route through, although further investigations (GPR and/or trial holing) would be required in order to confirm this.

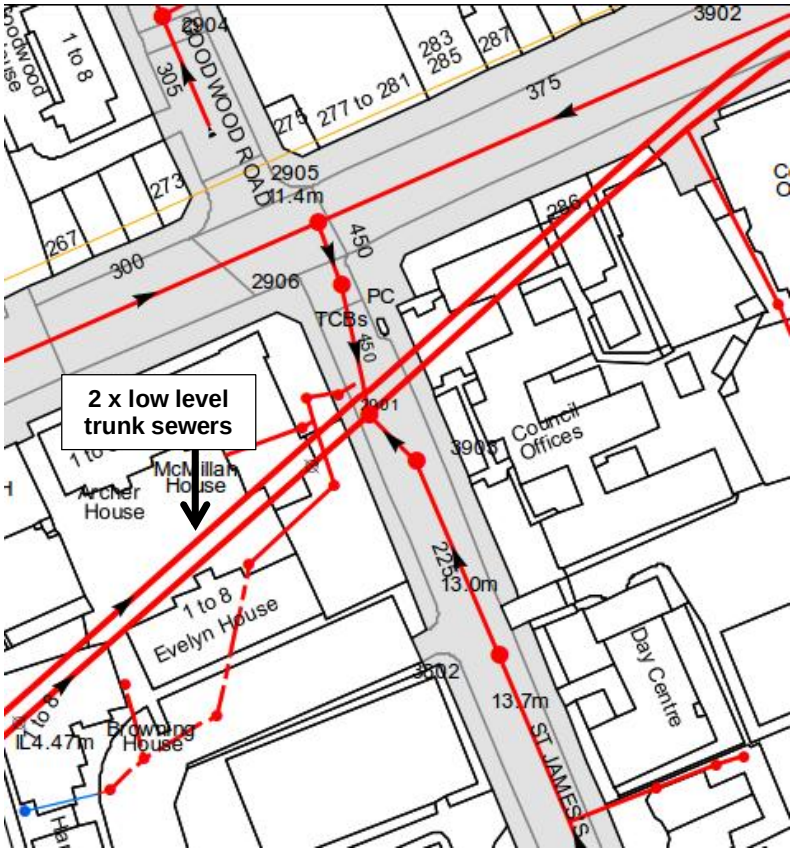
4.1.5 New Cross Road

There is no alternative to routing the pipe across New Cross Road, given its position directly to the north of Goldsmiths. The following services are installed within New Cross Road at the proposed crossing point between Goodwood Road and St James's.

- BT: telecoms
- Southern Gas Networks: LP gas main
- UK Power Networks: HV electricity cable
- Thames Water: trunk and distribution water mains
- Thames Water: low level combined sewer (below 10 metres invert level)
- Virgin Media: telecoms
- Vodphone: telecoms

Utilities drawings and the presence of manhole covers in the footways suggest most of the telecoms services, the LP gas mains and the water mains are installed in the footways. It is noted that further east, towards Laurie Grove, there are two low level trunk sewers running along New Cross Road; however at the point at which it is proposed the DH pipe would cross the carriageway (Goodwood Road), they are further south, in St James's. This is shown in
Figure 4-1.

Figure 4-1: Thames Water sewer infrastructure along at New Cross Road and Goodwood Road



Although it is not possible to accurately confirm the position of services without additional surveying, it appears that based on the utilities drawings, the majority of services running along New Cross Road are in the footway. Although it will still be necessary to find a route through these services, it is preferable that the carriageway is less congested with utilities than the footway, given the traffic flows on the carriageway and TfL's requirements for working in it (see accompanying *Transport infrastructure impact assessment* report).

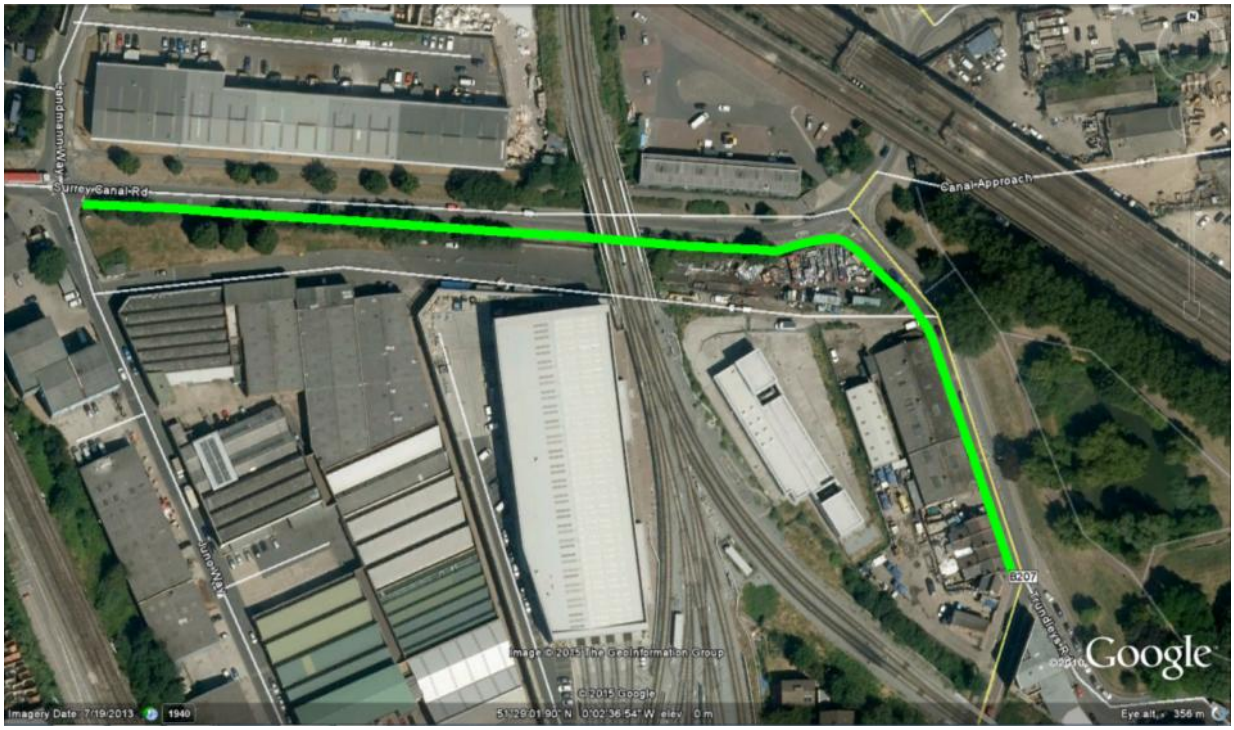
4.2 Further investigations

WSP | Parsons Brinckerhoff commissioned two days of ground penetrating radar (GPR) surveys in order to inform the routing process. Given the strategic importance of finding a route down Surrey Canal Road, GPR was undertaken through the south side footway and extended into the adjoining footway on Trundley's Road.

Section 3.3.1 discussed the options for installing the pipe in Surrey Canal Road. Of those options, it was concluded that installation within the carriageway or along the cycle path on the north side should be avoided if at all possible. The south side footway or soft dig land at the back of British Wharf were identified as the most attractive alternatives. Utilities drawings show that there are potentially some utilities in the south side footway; however it is not entirely clear. We therefore conducted GPR surveys in the south side footway, moving round to the west side footway on Trundley's Road, to the junction with Sanford Street.

The GPR survey area is shown in Figure 4-2.

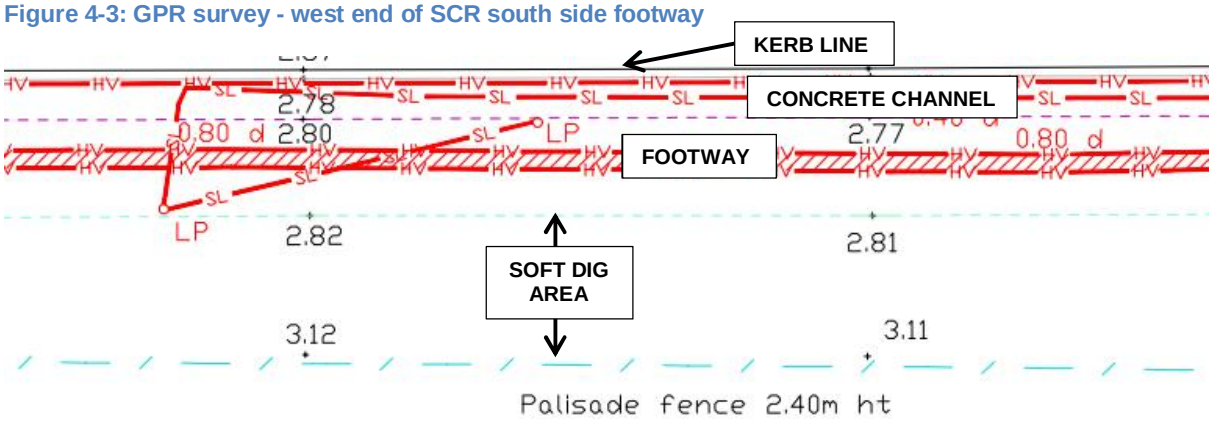
Figure 4-2: GPR survey area



The results (utilities layout drawings) of the GPR survey are provided in the New Cross Heat Network Feasibility Study *Element A Document Package* along with this report; however they are summarised here for information.

From the west end of Surrey Canal Road (i.e. nearer to SELCHP), there is an HV cable buried through the footway. This would make installation through this section of footpath unfeasible as the cable is in the centre of the footway. There is currently a section of soft dig land to the south of the footway, which does not contain any services, as shown in Figure 4-3. This may offer an alternative to the footway for this section of Surrey Canal Road.

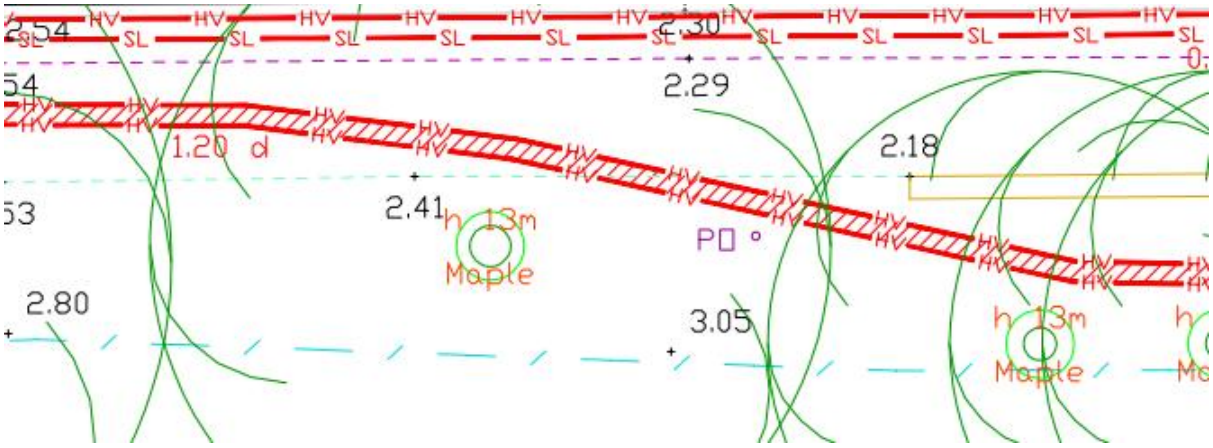
Figure 4-3: GPR survey - west end of SCR south side footway



In discussion with Glendale Services, who manage parks and landscaping for LBL, they felt that it would be possible to install pipework through the soft dig area adjacent to the south side footway as long as reinstatement was agreed and long term maintenance was at no cost to LBL. They suggested a grass verge would be suitable reinstatement. The contact at Glendale Services is Chris Thompson (chris.thompson@glendale-services.com). As such, it should be possible to install the pipework through the adjoining soft dig area where UK Power Networks' HV cable is in the south side footway.

Further east, the HV cable passes from the footway into the soft dig area, as shown in Figure 4-4.

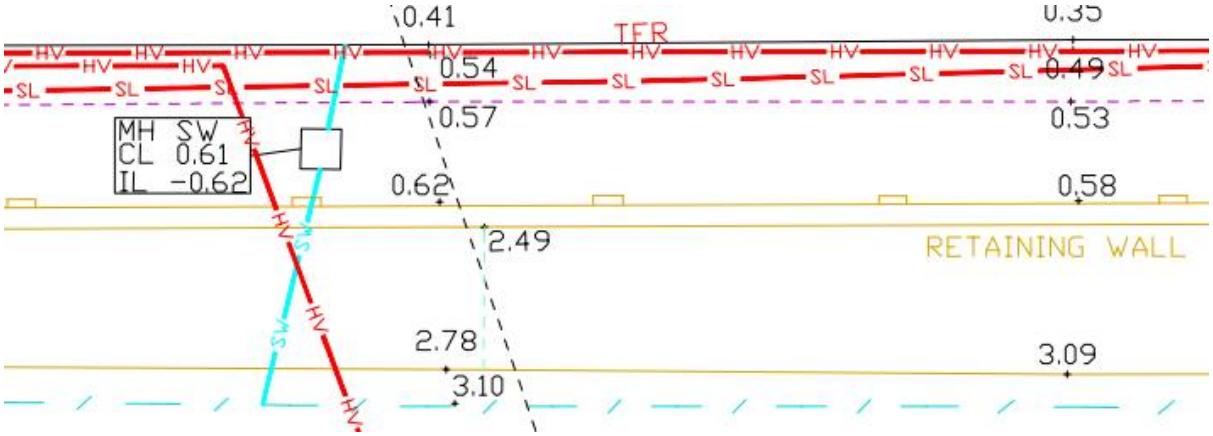
Figure 4-4: GPR survey – HV cable passing into soft dig area in SCR south side footway



It is noted that there are street light power (SL) and additional HV cables in the reinforced concrete channel (denoted by the purple dotted line) on the north side of the footway.

Once the HV cable moves into the soft dig area, there appear to be no more utilities running along the south side footway outside of the reinforced concrete channel, although there are several points where utilities cross the footway and two manholes with surface water (SW) drains running through them, one of which is shown in Figure 4-5.

Figure 4-5: GPR survey - south wide footway under railway bridge on SCR south side footway



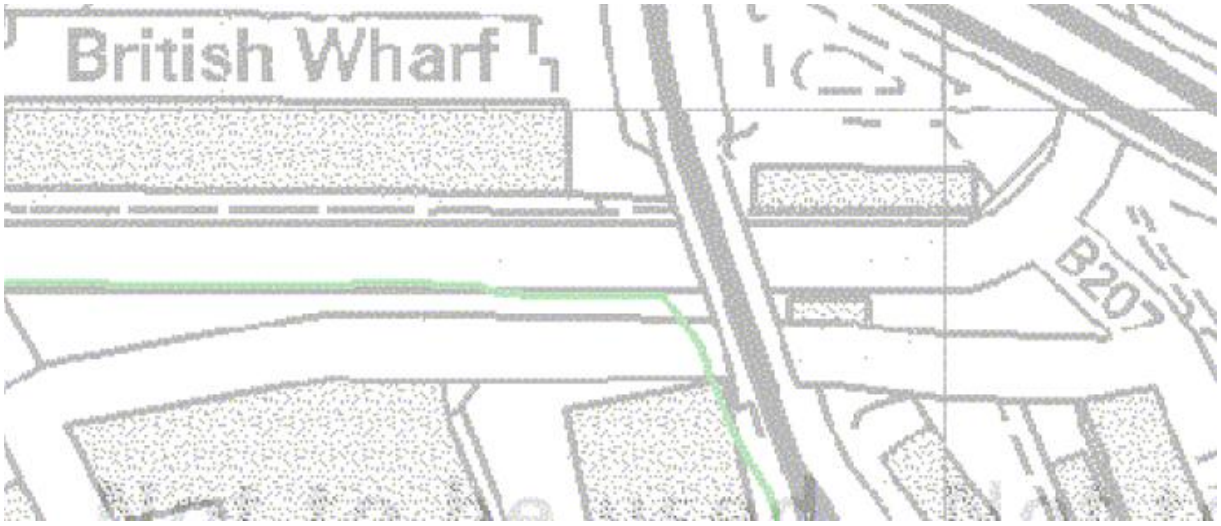
It is therefore proposed that the DH pipes could be installed in the footway once the HV cable passes into the soft dig area.

It is noted that there is one HV cable that the GPR survey was unable to pick up, so the indicative cable route was taken from record drawings (TFR on Figure 4-5); however the level of certainty around the position of this cable is obviously far lower than if they had been detected using the GPR.

High voltage cables are sometimes difficult to locate due to the electromagnetic field being less detectable compared to low voltage cable as a result of the load balancing that occurs between the phases. GPR teams try to physically locate the high voltage cable so that they can clamp a 'genny' around it, enabling them to get a much stronger signal to follow; however in this instance it was not possible. The only alternative is to use inductive monitoring, which involves laying the transmitter on the ground in case the signal can be carried along the HV cable. This method is normally extremely difficult when trying to pinpoint and separate a number of cables buried close together, as was the case on Surrey Canal Road.

Based on the position of the UK Power Networks HV cables, which were located in the south side footway (moving into the soft dig verge) and the National Grid utilities drawing, which appears to show their HV cable in the very edge of the carriageway or the concrete channel at the edge of the footway (see Figure 4-6), it is considered unlikely that National Grid's cable is in the main part of the footway. Figure 4-6 also shows how the National Grid Cable diverts south before the railway bridge.

Figure 4-6: National Grid transmission cable in SCR (cable shown in green)

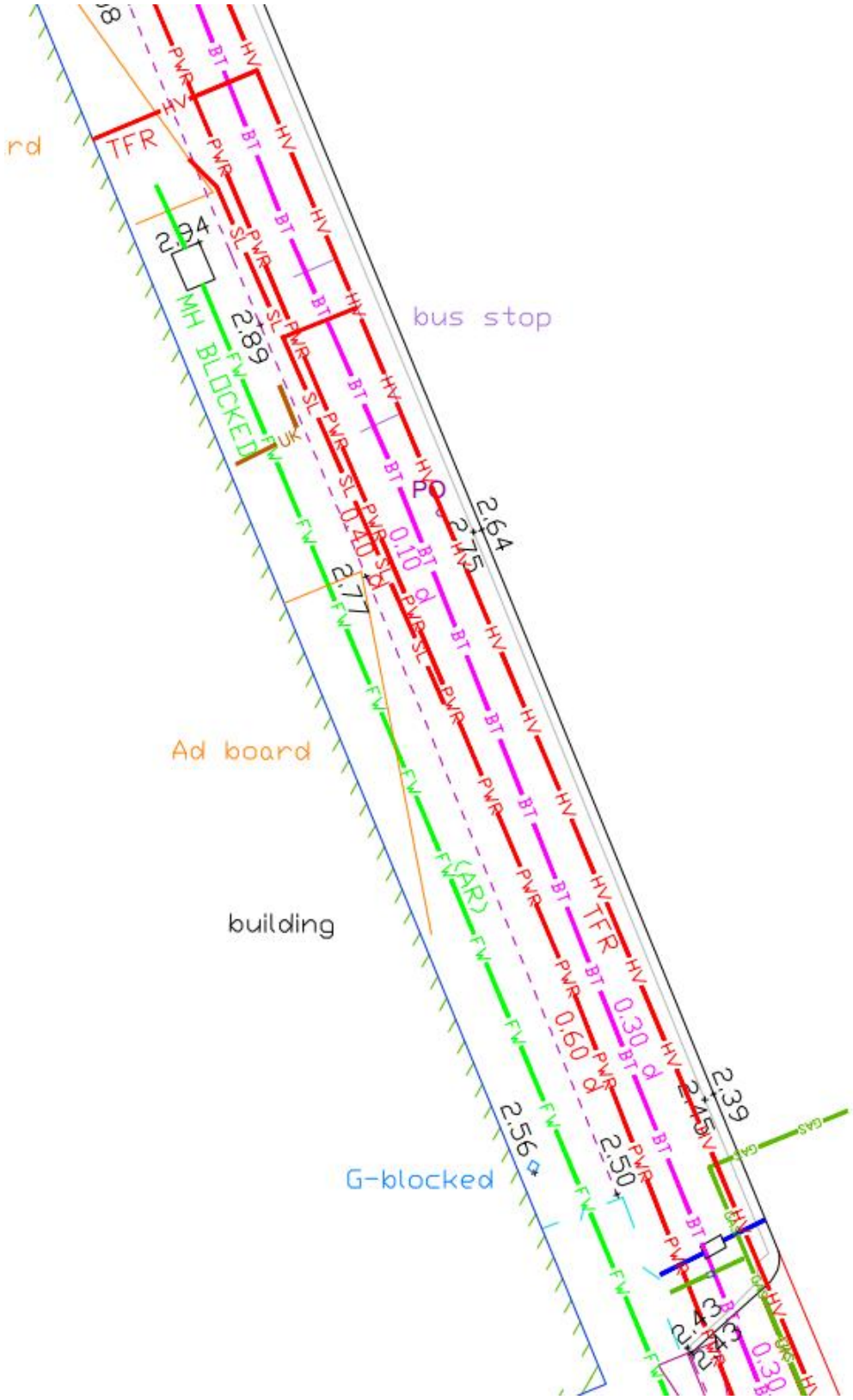


As a result of the above, it is concluded that installation of the DH pipework is likely to be feasible through some of the Surrey Canal Road south side footway from the point at which UK Power Network's HV cable diverts into the soft dig verge. Up to this point, it may be possible to install in the soft dig verge itself.

It must be emphasised that, although there appears to be room to install the pipe in the footway, the working area for the installation would be significantly wider – probably in the region of 5 metres – so there would undoubtedly be an impact on the traffic flows through the carriageway for the duration of works in this section.

As the GPR survey moves round onto Trundley's Road, it is clear that the footway to the west of the road is full of existing utilities, as shown in Figure 4-7.

Figure 4-7: GPR survey - Trundley's Road west side footway



It is concluded from this that it would not be possible to install the pipework in the west side footway on Trundley's Road and it would therefore be necessary to try and find a route through the carriageway or to install in the edge of Folkestone Gardens, as proposed by the DH contractor on the site visit. Southern Gas Networks' mapping shows the IP gas main runs in the east side of Trundley's Road, so it would be necessary to stay as far over to the west side of the carriageway as possible. Scarring in the road shows that there are already services in the west side of the carriageway, so finding a route through there would also prove difficult.

SECTION 5

ROUTES WITHIN SELCHP AND GOLSMITHS SITES

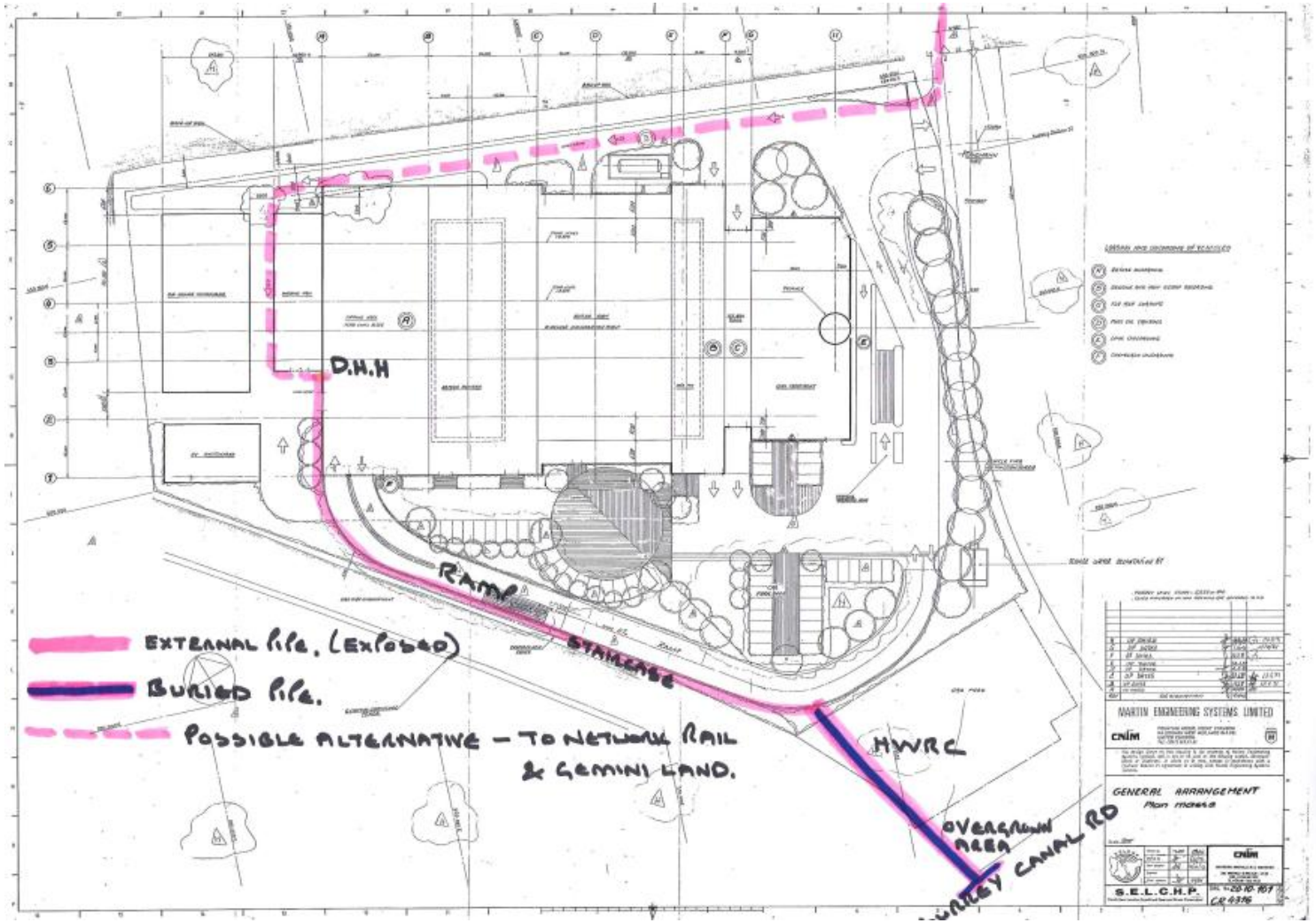
5 ROUTES WITHIN SELCHP AND GOLDSMITHS SITES

5.1 SELCHP

WSP | Parsons Brinckerhoff met with Veolia to discuss the pipe route within the SELCHP facility. Veolia proposed a route based on the availability of space within the facility and minimum disruption to operations.

The proposed route exits SELCHP via the LBL-owned Landmann Way Waste Reception Centre (WRC). As described in Section 3.3.2, it is proposed that the route within the WRC is modified so that the pipe exits out onto Landmann Way through the entrance to the WRC, rather than through the fencing at the back of the site (see Figure 3-11). The route within the SELCHP facility boundary remains as proposed by Veolia and shown in Figure 5-1.

Figure 5-1: Proposed route off SELCHP site



The route exits the SELCHP district heating hall at high level and runs along the side of the building to the elevated ramp that waste vehicles use to deliver waste to the facility. The pipes will then be suspended from the side or underside of the access ramp (Figure 5-2), emerging onto the grass verge that runs alongside the ramp (Figure 5-3), where the pipes will be buried before exiting out into the Waste Reception Centre.

Figure 5-2: Underside of ramp within SELCHP - pipes to be suspended from here

Figure 5-3: Grass verge to side of SELCHP access ramp - pipe to emerge from under the ramp here

Figure 5-4: Landmann Way Waste Reception Centre, taken from SELCHP

No further investigation of the route within SELCHP has been undertaken as part of this study as it will be Veolia's decision as to how the apparatus is incorporated into their facility. The route proposed by them is therefore assumed to be the most viable route off the site.

5.2 Goldsmiths

WSP | Parsons Brinckerhoff have liaised with Goldsmiths to determine the point(s) of interface with a New Cross Heat Network within the campus. It was highlighted by Goldsmiths that a new building – 1 St James's – will be constructed over the next few years (estimated completion is currently October 2018) and will contain a new energy centre.

The campus already has its own heat network, with extensions and links proposed in the short to medium term, such that most, or all, of the campus heat demand could be served from the new 1 St James's energy centre and the existing Education Building plant room. As such, the proposed points of interface for a New Cross Heat Network within Goldsmiths are the Education Building plant room and the forthcoming 1 St James's building. The positions of these buildings within the campus and the proposed pipe route are shown in
Figure 5-5. The pipe route was agreed with Goldsmiths' Head of Energy, Environmental & Engineering, Estates & Facilities during a site visit.

Figure 5-5: Goldsmiths - Education Building & 1 St James's

The route within the campus would require the use of the passageway linking St James's and Laurie Grove and another small passageway between Laurie Grove and the Education Building (as shown in Figure 5-6 and Figure 5-7). It is therefore considered that a wayleave may be required in order for a party other than Goldsmiths to install the DH pipework in Goldsmiths owned land.

Figure 5-6; Passageway from St James's through to Laurie Grove (taken from Laurie Grove)

Figure 5-7: Passageway from Laurie Grove through to Education Building (taken from Laurie Grove)

SECTION 6

LAND OWNERSHIP AND RESIDENT / BUSINESS INTERFACES

6 LAND OWNERSHIP AND RESIDENT/BUSINESS INTERFACES

6.1 Land Ownership

LBL has advised that the majority of the land through which the assessed pipe route options would run is owned or adopted by the Council.
Figure 6-1 shows the extent of LBL's land ownership within the study area. It shows how all of the roads to the north of Goldsmith's College, through which the assessed route options run, are adopted highway.

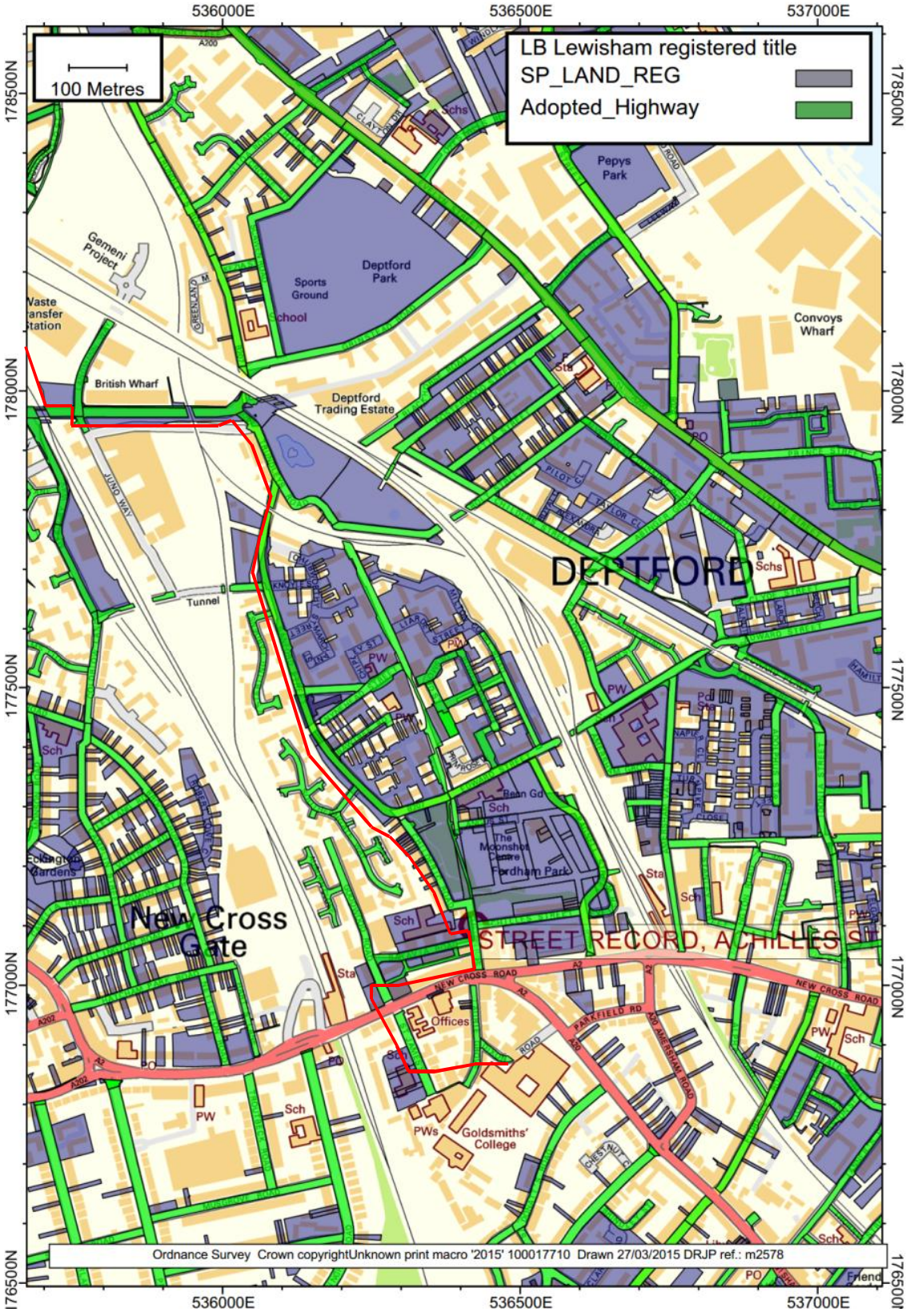
Land on the SELCHP site itself is owned by SELCHP Ltd, meaning a wayleave would be required for the installation of heat network infrastructure unless Veolia were installing the pipe themselves. A discussion of the pipe route within the SELCHP site boundary is presented in Section 5.1.

Land within the Goldsmiths site is owned by Goldsmiths, meaning a wayleave would be required for installation of heat network infrastructure there, assuming Goldsmiths were not installing the pipework themselves. A discussion of the pipe route within Goldsmiths is presented in Section 5.2.

There are two sections of land outside of SELCHP and Goldsmiths that have been considered for installation of the heat network and are not owned or adopted by LBL. The first is the area adjacent to the Surrey Canal Road cycle path, which is owned by the British Wharf industrial estate (as discussed in Section 3.3.1 and shown in Figure 3-4). As such, a wayleave would be required to install the pipe through this area. The second is New Cross Road, which is a TfL red route, as discussed in Section 3.3.5 and in the accompanying *Transport infrastructure impact assessment* report.

A map of LBL-owned land and adopted highways is presented in
Figure 6-1.

Figure 6-1: LBL land ownership (blue) and adopted highway (green) along proposed network route (red)



It is beyond the scope of this study to undertake a full land ownership search for the study area; however it is concluded that
Figure 6-1 provides a clear indication of the areas within the proposed route that are not owned or adopted by LBL. Pending formal confirmation, British Wharf, SELCHP and Goldsmiths College are the only other parties with land ownership along the routes being considered.

6.2 Interfaces with local businesses

During site surveys, we noted all the businesses that may be affected by the installation of pipes in the study area. A summary of those businesses is presented in Table 6-1.

Table 6-1: Businesses in the study area

Road	Businesses affected	Type
Surrey Canal Road	SELCHP	EfW facility
	Landmann Way Waste Reception Centre	Civic waste/recycling centre
	Gooding Aluminium	British Wharf Industrial Estate
	Etag Fixings	
	Kings College Hospital Wheelchair Maintenance Service	
	Blast Spray & Polish Ltd	
	Riverside Group London Ltd	
	Phoenix Electrical Company Ltd	
	SI Pumps Ltd	
	Imex Express Cash & Carry	
	Juno Enterprise Centre	Juno Way Trading Estate
	Flour Power City Bakery	
	Douglas Metal Finshes Ltd	
	Surrey Engineering Ltd	
	Arthur Thompson Cutting Forms Ltd	
	D&L Draught Soft Drinks	
	DAF Supplies Londond	
	Artistic Spaces	
	Illusion	
	Axion	
	Bahama	
	Digital Holdings Empire	
	A&E Elkins Ltd	
	London Overground depot	
	J's Cafe	Café
Trundley's Road	DD Scrap Metal	Scrap
	SE8 Test Centre	Car garage
	Transweld	Welding & commercial vehicles
	Slade Green Plating	Rechroming specialists
	Albany Waste Management	Waste management
	European Taste Restaurant	Small retail
Sanford Street	Little Majesty	Small retail
	Kilgannon Street Care	Road sweeper business
Clifton Rise	Venue Nightclub	Nightclub/bar
	Puzzle Organico	Retail
	We Care Chemist	Retail
	Rose's Kitchen Caribbean Takeaway	Takeaway
	Golden City Chinese Takeaway	Takeaway
	Momex Stores off license	Retail
	BWA Muslim Cultural Centre	Community Centre
	New Cross Inn	Public House
	New Cross Inn Hostel	Hostel
	Chick Chicken	Takeaway
	Choice Cars	Taxi company

6.3 Housing associations and resident groups

The Council has advised that residents do not welcome noise and disturbance, particularly involving works to highways. Once the route is confirmed, a public exhibition / consultation with local residents is advised to inform them of the scheme and (once known) the timing and duration of the work.

If suitable controls are put in place, noise and disturbance can be minimised. Such controls include daytime working (i.e. 9am to 5pm) during school holidays, and combining works with other utilities works as far as possible, to minimise the extent of local disturbance; however it is also noted that some areas of the proposed route (e.g. New Cross Road) are likely to require out of hours working, although these are areas of high traffic flow and are therefore less residential and less likely to cause noise disturbance to local residents.

WSP | Parsons Brinckerhoff contacted Lewisham Homes, which is LBL's Arms-Length Management Organisation (ALMO), to discuss the presence of Housing Associations (HAs) and residents' groups in the area. They informed us that the area through which the network will run is called Milton Court Estate and covers Woodpecker Road, Ludwick Mews and Hawke Tower.

The Milton Court Estate is managed by Lewisham Homes and Family Mosaic housing association. There is also a tenants and residents association (TRA) set up to cover the Milton Court Estate.

Amicus Horizon – another HA – also has some homes around the Edward Street area, which runs between Woodpecker Road and Fordham Park. The Five Ways tenant management cooperative also manages some properties in the area, although we were unable to confirm which properties.

SECTION 7

LOCAL AUTHORITY REQUIREMENTS

7 LOCAL AUTHORITY REQUIREMENTS

7.1 Road working consents

Installation of DH pipework in the road must be in accordance with the New Road and Street Works Act (NRSWA) and the Specification for the Reinstatement of Highway (SROH).

In order to undertake major works in the road in Lewisham, a minimum of three months' advance notice must be given to LBL. Starts may be granted early upon receipt and agreement of full project details and proper coordination. Advance notice should be given by the Works Promoter. This does not need to be the contractor and may be the project manager within the client team. As such, it is recommended that advance notice is given as soon as the pipe route has been fixed so as to avoid delays to the contractor's programme. Note that a separate permit is required for each road through which works are planned.

As the installation of the pipe will not be undertaken, or directly employed by, a utilities company or the Highway Authority, a Section 50 license will be required for working in the public highway. The Section 50 licence ensures that the Contractor carrying out the works is competent to do so and that there are sufficient funds available during the guarantee period of the works. Copies of Section 50 application documentation are provided in the New Cross Heat Network Feasibility Study *Element A Document Package* along with this report.

The Contractor may not begin works in the road until the Section 50 license has been granted. The turnaround time for an application, as advised by LBL, is no longer than one month. It is noted that a Section 50 application fee of £390 applies as well as a deposit of £500, refundable after two years, for excavations less than 1.5m deep; and £1000, refundable after three years, for excavations greater than 1.5m deep.

7.2 Parking bay suspensions

Parking bay suspensions as required would be arranged via NSL, who manage LBL's parking services. The relevant contact at NSL is Johnson Iroro (Johnson.iroro@nslservices.co.uk).

7.3 Traffic management, diversions, road closures

Traffic management and road diversions and road closures must be arranged with LBL's Network Management team (dave.wheeler@lewisham.gov.uk). All applications must be submitted with full details shown on drawings and maps, which should be submitted along with a completed *Application for Temporary Traffic Management Order*, a copy of which can be found in the New Cross Heat Network Feasibility Study *Element A Document Package* along with this report.

7.4 Planned road closures and events

At the time of writing, LBL are not aware of any planned road closures or events in the vicinity of the proposed route; however this should be reconfirmed as the project develops and programming for the works is undertaken.

7.5 Interface with other development

The area of Lewisham through which it is proposed the heat network will pass is a focal point for redevelopment in the borough. As such, it is important that the installation of the DH pipe system is coordinated with development in the wider area to ensure that:

1) There is no construction programming or long term conflict between the heat network and other developments in the same area;
2) Opportunities to coordinate these works with other planned works to mutual benefit are not missed;
3) The heat network is sufficiently future-proofed such that potential future heat customers can connect as they come forward.

7.5.1 Conflict with other development construction

The key developments for which planning permission has been granted have been identified and the preferred route does not pass through any allocated or significant development sites with potential for redevelopment in the short term.

It is noted however that New Cross / New Cross Gate is allocated as a key regeneration and growth area in the London Borough of Lewisham's Core Strategy. Together with Deptford and Deptford Creekside, the New Cross / New Cross Gate area is expected to accommodate up to 2,300 additional new homes by 2016 and a further 8,325 new homes by 2026.

The wider area is therefore anticipated to accommodate a significant amount of additional development (largely comprising residential use), over the next 10 years or so. More detailed discussion of future development and associated network expansion opportunities will be presented in *Element B* of this feasibility study.

WSP | Parsons Brinckerhoff, with input from LBL planners, have identified two major risks associated with routing in the vicinity of other developments:

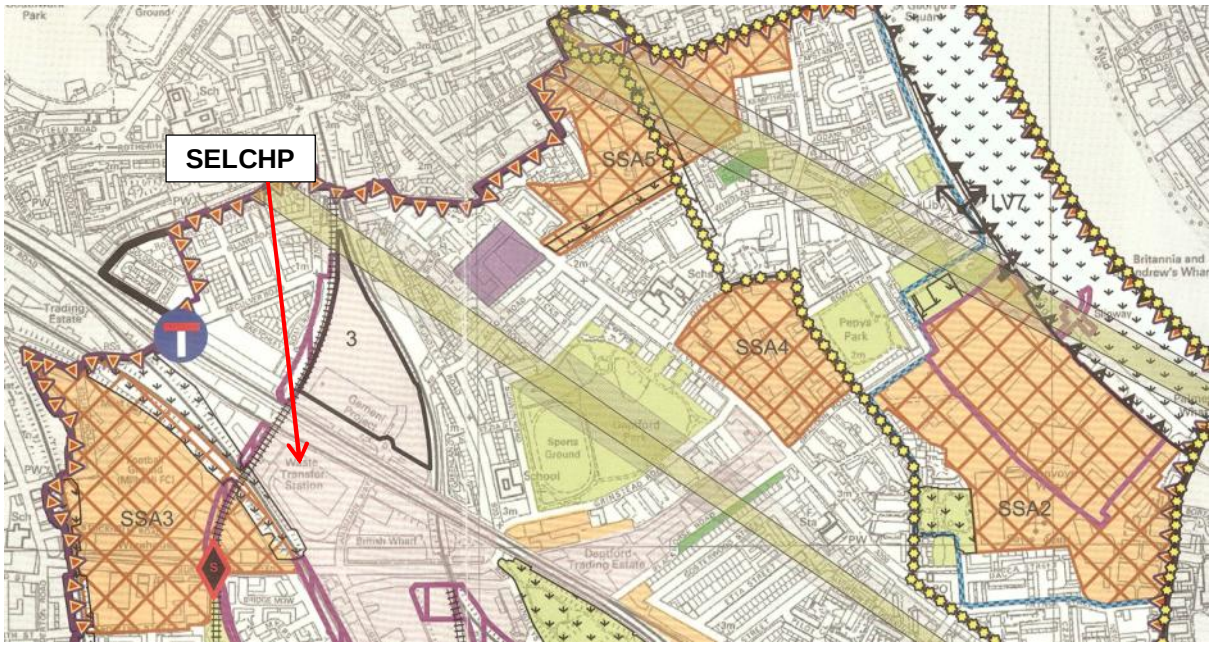
1) Installing the heat network along a route that is utilised by construction vehicles for deliveries and access to other development sites;
2) Installation along an area that forms part of a recently completed development.

Site access clashes

With regard to site access (i.e. point 1 above), there are several Strategic Site Allocations with proposals for major development projects whose access could be restricted by the proposed heat network installation. They are identified on
Figure 7-1 as follows:

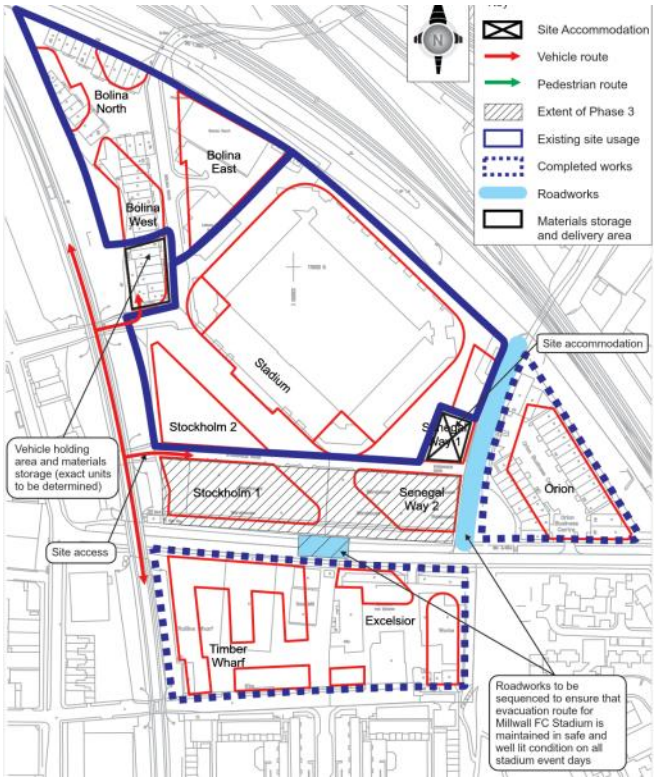
- SSA2: Convoys Wharf (outline planning permission granted March 2015)
- SSA3: Surrey Canal Triangle (outline planning permission subject to S106 agreement granted March 2012)
- SSA4: The Wharves Deptford/Oxestalls (outline planning permission for the whole site and full planning permission for phases 1 & 2 was granted in March 2012 subject to S106 agreement)
- SSA5: Plough Way (full planning permissions granted subject to S106 agreements).

Figure 7-1: Strategic Site Allocations in vicinity of the proposed DH route



WSP | Parsons Brinckerhoff consulted planning documents for each of the SSAs looking for indications of construction access and routes. The Surrey Canal Triangle (SSA3) documentation contains Construction Logistics Plans which show access to the site from Idleton Road to the west of the site (see Figure 7-2). SELCHP and the proposed heat network are located to the east of the development area, so there may not be any major conflict with access; however it is noted that Surrey Canal Triangle sits on either side of Surrey Canal Road, along which it is proposed the heat network will run. As such, there is the potential for issues around site access along Surrey Canal Road if the heat network construction works occur at the same time as the Surrey Canal Triangle development.

Figure 7-2: Surrey Canal Triangle development site access

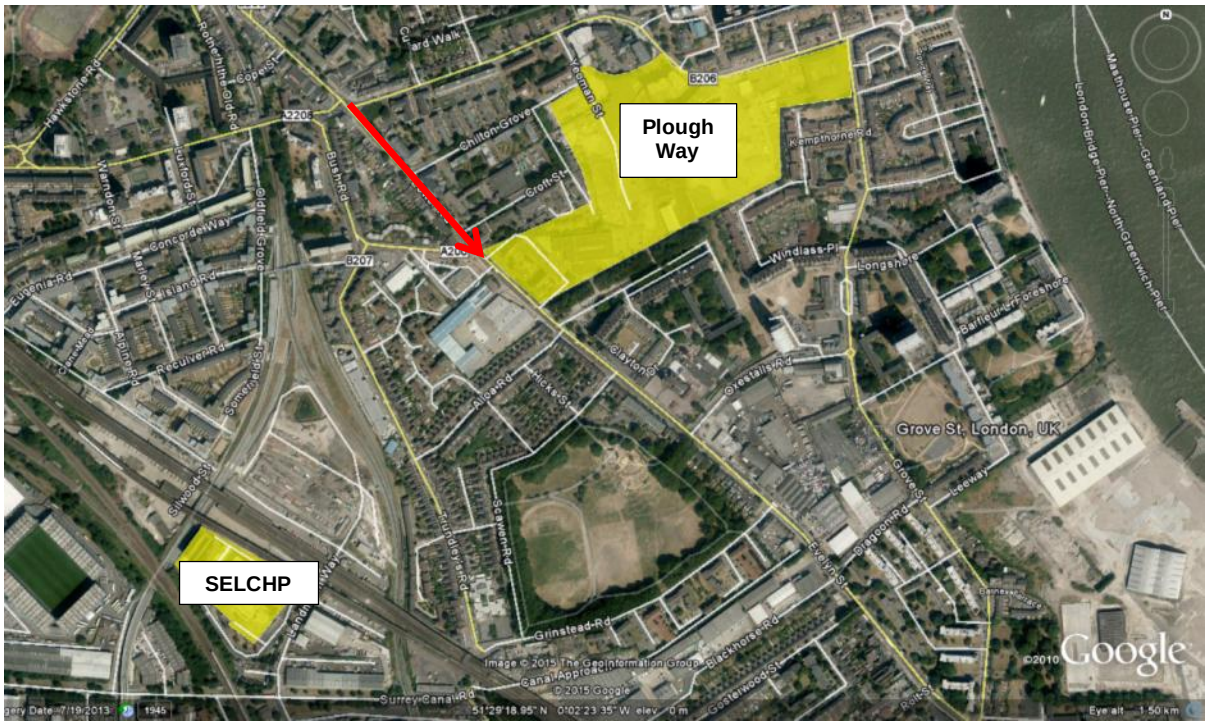


The SSA5 planning documentation contains a Preliminary Construction Logistics document which describes site access for the Plough Way Development. It states that:

"*It is anticipated that all construction traffic will travel to the A200 by the Lower Road / Plough Way junction and then on to the gyratory.*"

Figure 7-3 shows the Plough Way development and the access route as described in the Preliminary Construction Logistics document.

Figure 7-3: Plough Way proximity to SELCHP and site access (red arrow)



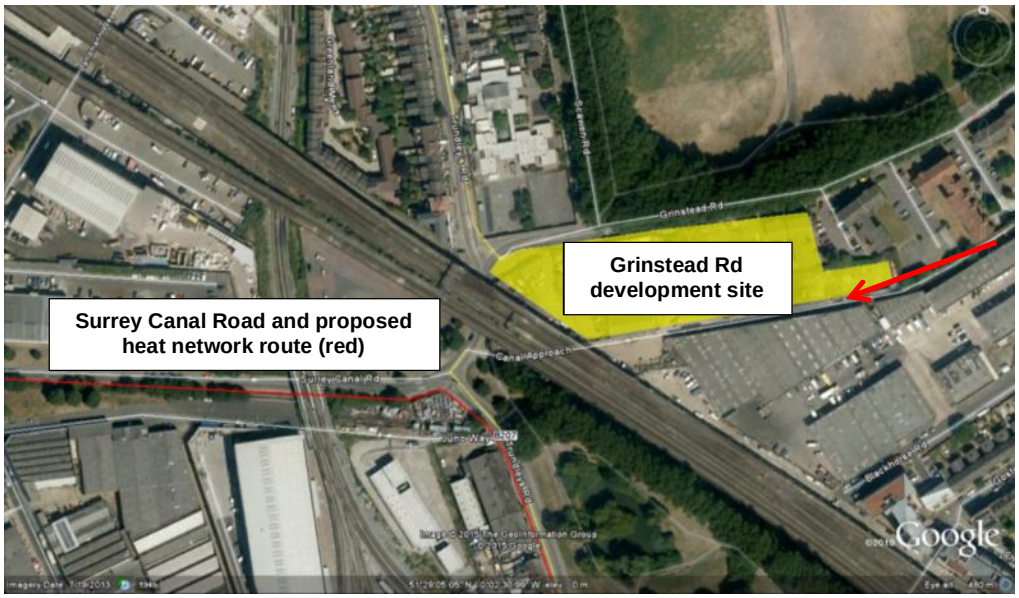
Based on the access route shown above, it is unlikely that access to the Plough Way development will be compromised by works on the proposed heat network should the two projects occur at the same time.

Construction access information was not available for Convoys Wharf (SSA 2) or The Wharves Deptford (SSA 4) at the time of writing; however based on their location in relation to the proposed heat network – i.e. to the east on a similar longitude to the Plough Way development – it is unlikely that construction access for these two SSAs will be compromised by the proposed heat network should their construction periods overlap.

There are also smaller development areas, additional to the SSAs, at Juno Way Trading Estate, Grinstead Road, Goodwood Road and Bond House.

Grinstead Road is located to the east of Surrey Canal Road, close to the proposed network, as shown in Figure 7-4. The planning documentation submitted for the development includes a Construction Management Plan, which states that site access is expected to be from the A200, which is to the east of Grinstead Road, as indicated by the red arrow in Figure 7-4. Surrey Canal Road is to the west of the site, so with traffic coming from the east, the potential for conflict is reduced; however it is noted that the Grinstead Road development is in close proximity to the heat network route. If the delivery programmes for the heat network and the Grinstead Road development overlap, coordination with the developer to ensure minimum disruption would be advisable.

Figure 7-4: Grinstead Road development location



Bond House and the Goodwood Road development sites are both located on Goodwood Road. The positions of both developments are shown on Figure 7-5. Access for the Goodwood Road site, which is already being cleared by the developer, is from New Cross Road to the south of the site. Access to Bond House could only be via Goodwood Road from New Cross Road as Goodwood Road is a dead end.

Figure 7-5: Bond House and Goodwood Road development sites

Given the position of the two developments, it is concluded that the heat network has the potential to cause major disruption to the Bond House site, which would be accessed from Goodwood Road itself; but probably minimal disruption to the Goodwood Road development, as it is accessed from New Cross Road.

It is therefore recommended that developers are engaged at the earliest opportunity as and when the decision to proceed with heat network is taken in order to discuss and coordinate programming and construction access as required.

Excavation along recently developed sites

With regard to installation along an area that forms part of a recently completed development (i.e. point 2 above) it has been noted by LBL planners that installing pipe in a section of newly developed land should be avoided wherever possible and, where it is not possible, ensuring that reinstatement is to the same standard as was previously the case and using the same materials.

There are several areas where this may be a factor for the heat network. Firstly, the soon-to-be-completed Batavia Road development just north of New Cross Road, which is required under its planning permission to connect to the heat network when it becomes available. The initial proposed route does not run through the development; however subsequent assessment has shown that it would be preferable to cross New Cross Road from Goodwood Road, with Batavia Road the obvious route between Clifton Rise and Goodwood Road (see Section 3.3.5 and Figure 3-20). As such, the proposed heat network route will require installation through Batavia Road and it would therefore be necessary to ensure reinstatement through this area is to the same standard as before installation.

The proposed route will also be required to cross the new cycle path on Surrey Canal Road. It may be possible to minimise or completely avoid the requirement to excavate through the new cycle path by crossing in the carriageway at the junction of Landmann Way and Surrey Canal Road, where it is assumed the road surface will remain as it is. If the pipework is installed through the cycle way, then it will be necessary to replace the bonded gravel that is excavated, across the full width of the cycle path.

If the network is extended to serve additional loads, it may be necessary to replace brick paved highways; for example at Ludwick Mews, where the access roads are all of this type.

7.5.2 *Opportunities to coordinate with other developments in the area*

The initial preferred route and various alternative options (see Section 3.1) do not pass directly through any other development areas, with the exception of Batavia Road, which is the proposed route between Clifton Rise and Goodwood Road under Option F. The Batavia Road development is scheduled for completion this year, so there is no opportunity for coordination with the installation of a heat network.

It is noted that *Element B* of this study will assess the potential for network expansion and several of the expansion options considered will be future developments such as the SSAs discussed in Section 7.5.1. As such, there may be opportunities to minimise the need to dig up areas of these new developments or to reduce the extent of future extensions to the primary network by installing sections of pipework as part of the development works, such that a connection to a future DH network can be made at a predetermined point. This approach would need to be agreed with developers in advance and it is suggested that they are engaged at the earliest opportunity to discuss timeframes and options for coordination should the heat network be progressed.

7.5.3 *Future-proofing the network for future development*

Element B of this feasibility assessment will consider the expansion of the network in more detail; however it should be noted that, given the scale of development and regeneration planned for the area, it is important that the proposed network is sized appropriately to allow connection of future developments as they come forward. All of the developments discussed in this section will be considered as future expansion opportunities for the network in the *Element B* report.

It is noted again that the position of these new developments – nearly all of which are to the east of SELCHP – make it very important to find a route through Surrey Canal Road with the DH pipe so that the opportunity to make future connections is not lost.

SECTION 8

CONCLUSIONS

8 CONCLUSIONS

8.1 Summary of additional reports

This report forms part of a wider set of reports which comprise *Element A* of the New Cross Heat Network Feasibility Study. The accompanying *Element A* reports are:

- New Cross Heat Network: Transport Infrastructure Impact Assessment;
- New Cross Heat Network: Archaeological Constraints Report
- New Cross Heat Network: Contaminated Land Report
- New Cross Heat Network: Preliminary Ecological Appraisal

The four accompanying reports have each assessed the initial preferred route and surrounding study area, from which alternatives were developed (see Section 3.1).

The Archaeological Constraints Report concluded that there is a possibility of archaeological remains being observed throughout the course of the works based on the archaeological history of the area; and that an archaeological watching brief should be considered during the course of these works.

The Transport infrastructure impact assessment concluded that the transport component of the project will require forward planning and consent from various authorities; however with sufficient planning and lead-in time this is expected to be achievable without unnecessary delay to construction. The biggest obstacle will be installation in New Cross Road as it cannot be avoided and TfL will not allow a full road closure. Pedestrian and cycle diversions and further engagement with TfL, Network Rail and other stakeholders will be required to gain the necessary consent for work to progress in the vicinity of their infrastructure.

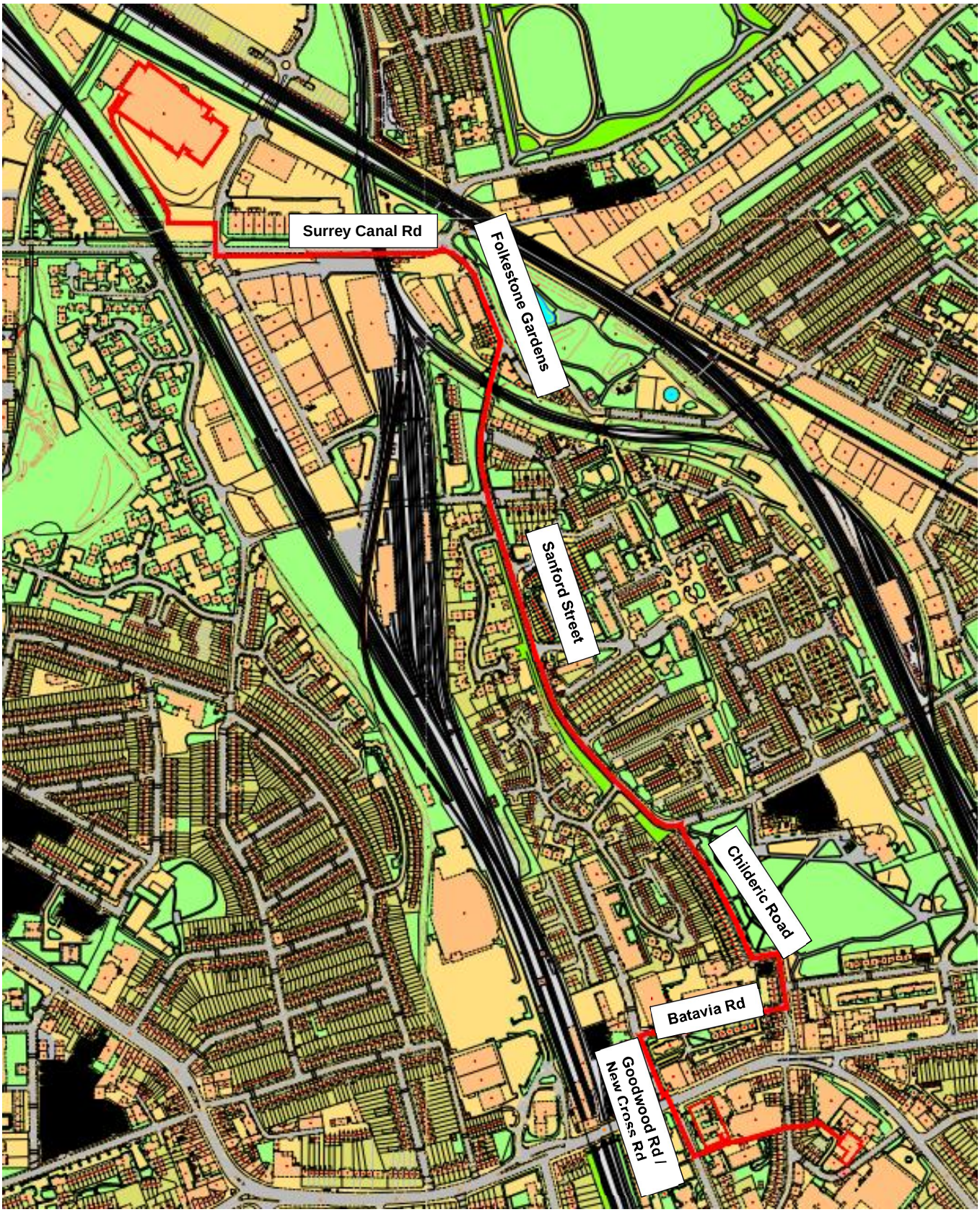
The Contaminated Land Report concluded that there is a LOW to MODERATE risk to receptors from contamination and a MODERATE unexploded ordnance hazard level. It recommends a limited programme of intrusive investigation to undertake soil characterisation and support design considerations. Investigations should also be targeted at Surrey Canal Road as it was once the Grand Surrey Canal and was reportedly in-filled with inert commercial and household waste.

The Preliminary Ecological Appraisal desk study identified several nature conservation sites as well as Phase 1 Habitat types and suitable habitats for breeding birds, roosting bats, reptiles, terrestrial and aquatic vertebrates. As such, vegetation loss and indirect impacts (e.g. noise and light pollution) should be avoided in parks, railway line sides, street trees etc.; and further surveys may be required for legally protected species such as bats, great crested newts and reptiles if these areas are disturbed during installation.

8.2 Preferred route

Based on the analysis undertaken herein, and supported by the findings of the additional reports discussed in Section 8.1, a preferred route between SELCHP and Goldsmiths has been identified. That route is shown in
Figure 8-1 and the Preferred Route map (3514033A-M003) that accompanies this report.

Figure 8-1: Preferred route



It must be noted that the preferred route is based on the investigations that were undertaken as part of this study; however there is still some uncertainty around some sections of the route – particularly Surrey Canal Road.

A route through the south side footway on Surrey Canal Road appears to be available; however it would not be possible to install through this area without significantly disrupting traffic flows along Surrey Canal Road itself due to the necessary working area for the heat mains installation.

A less disruptive alternative to the south side footway is the British Wharf-owned soft dig land to the north of the Surrey Canal Cycle path – crossing over the cycle path to the raised area on the other side of the cycle path at the London Overground railway bridge. This would minimise the impact on traffic flows along Surrey Canal Road to some extent, however it would require a wayleave for installation in British Wharf's land and it would still be necessary to cross Surrey Canal Road at the junction with Trundley's Road..

The initial preferred route utilised Folkestone Gardens and in discussion with LBL Cycle Programme and Parks officers, they advised that it is soon to undergo remodelling as part of its inclusion in the new cycle route and that it should be avoided. WSP | Parsons Brinckerhoff therefore assessed Trundley's Road as an alternative, which runs parallel to Folkestone Gardens and complements the proposal to avoid Woodpecker Road by branching off down Sanford Street. However, following review of the utilities drawings and subsequent GPR surveying, it is clear that Trundley's Road is heavily congested with existing utilities and installation through this section of the proposed network route may be very complicated and, therefore, expensive. An alternative was subsequently identified in a site visit with a DH installer, who commented that the pipe could be installed in the soft dig land around the edge of Folkestone Gardens until it branches off down Sanford Street. This would require a small amount of re-landscaping at the very edge of the park, but would not cause any disruption to the footpaths, cycle route and play areas in the park.

The initial preferred route also passed through Fordham Park; however this area has also been recently remodelled and LBL Parks officers stated that it should be avoided if at all possible. An alternative has been found on Childeric Road. However it is noted that this road does contain multiple existing services and would require significant parking bay restrictions. It would therefore be necessary to undertake trial excavations and GPR surveys on Childeric Road to determine the availability of a route and, if one cannot be found, routing through Fordham Park may still be required.

8.3 Risk Analysis

WSP | Parsons Brinckerhoff has undertaken a high level assessment of the risks associated with the installation of the network along the proposed route. The risk analysis is presented in Figure 8-2 and includes an assessment of whether the risks have been, or will be, mitigated by the outputs of this feasibility study.

Figure 8-2: Risk assessment

ID	Item	Initial risk				Residual risk			
		Likelihood (1 = highly unlikely; 5 = almost certain)	Consequences (1 = insignificant; 5 = catastrophic)	Risk grading	Action proposed	Likelihood (1 = highly unlikely; 5 = almost certain)	Consequences (1 = insignificant; 5 = catastrophic)	Risk grading	Mitigated through feasibility study? (YES / NO / PARTIALLY)
1	Utility diversions required to existing services	4	3	12	- Pre-construction programme of trial holing and GPR to try and find route through congested areas without requirement for diversions.	4	2	8	
2	Programme delay due to installation complexity (hand dig)	5	3	15	- Routing prioritises areas where mechanical excavation is more likely, i.e. Sanford Street over Woodpecker Road	4	2	8	
3	Proximity to intermediate pressure gas main requires hand dig	5	3	15	- Routing seeks to avoid the position of the IP gas main where possible.	4	2	8	
4	Lane rental fees for working in New Cross Road	4	2	8	- Working outside of hours through which lane rental fees apply where possible.	3	1	3	
5	Damage to TfL/Network rail bridges	3	4	12	- Liaison with TfL/NR regarding design and installation methodology once finalised; -TfL/NR to witness and advise on installation through their infrastructure.	1	4	4	
6	Damage to existing services during excavation	4	3	12	- Pre-construction programme of trial holing and GPR; - Utility company witnessing in proximity to major services, e.g. IP gas main.	2	3	6	
7	Delays due to discovery of archaeologically significant items	3	3	9	- Archeaological Constraints Report identifies areas with likelihood of discovering archaeological remains; - Apply arcaheological watching brief in these areas and ensure site team have a clear methodology for what to do in the event that something is uncovered in order to minimise delays.	3	2	6	
8	Delays and disposal cost due to discovery of conatminated land	3	3	9	- Soil characterisation to be undertaken during trial holing process prior to construction phase; - Final route selection to take account of soil waste clasification and suitability for reuse and minimise requirement for, and cost of, landfill disposal.	2	2	4	
9	Delays and disposal cost due to discovery of unexploded ordnance	2	3	6	- For excavations below 1m in areas identified as Moderate Risk by UXO survey, employ an Explosive Ordnance Clearance (EOC) operative to supervise works.	2	2	4	
10	High reinstatement costs routing through newly laid cycle path(s)	4	3	12	- Minimise requirement for routing through cycle path(s) by utilising alternatives along Surrey Canal Road and avoiding Folkestone Gardens.	3	1	3	
11	High reinstatement costs routing through remodelled park(s)	4	2	8	- Proposed route avoids Folkestone Gardens and Fordham Park.	2	1	2	
12	Cost of wayleaves	3	3	9	- Where possible, avoid routing through non-LBL owned land; - Full land ownership search prior to final route selection.	3	2	6	
13	Increased cost of laydown area/site compound due to lack of space under LBL control in close proximity to the site	3	3	9	- Element C of this study to propose site options, following consultation with LBL.	1	3	3	
14	Cost of security for laydown area if it is in a public space	4	3	12	- If possible, find a laydown area/site compound location within a secure area - for example a private premises. - Element C of this study to propose site options, following consultation with LBL.	3	3	9	
15	Installation constraints require trench sequencing over shorter distances	4	3	12	- Where possible, avoid route selection in areas where sequencing is likely to be required, e.g. Surrey Canal Road carriageway, where traffic flow should be maintained as much as possible.	3	2	6	
16	Specific trench requirements due to route selection and installation constraints	3	3	9	- Avoid route selection in areas of high traffic flow, where shallow installation (i.e. due to existing services) would require steel protection plates above the DH pipework.	2	2	4	
17	Cost of alternative civic recycling centre provision during period of closure for Landmann Way Waste Reception Centre	5	3	15	- Ensure programming minimises the duration for which the WRC is closed. Use out of hours working where possible.	5	2	10	
TOTAL				184	TOTAL			94	

8.4 Areas for further investigation

This report has gone some way to finding a viable route between SELCHP and Goldsmiths. The initial preferred route has been shown to be unfeasible in certain areas – particularly Woodpecker Road – and alternative routes have been found. It should be noted, however, that the availability of a pipe route through some of the more congested areas cannot be confirmed without further investigation.

In order to confidently find and cost a route for DH pipework through an area this congested with existing utilities, a programme of ground penetrating radar and trial dig investigation is required. This is particularly the case around Surrey Canal Road and Trundley's Road where there is limited space for installation (the pipe would still have to cross Trundley's Road if it was installed in Folkestone Gardens in order to access Sanford Street). As mentioned in Section 8.3, it would also be beneficial to undertake trial digs along Childeric Road as the utilities drawings show there are a number of existing services in the road and finding a route through them may not be straightforward.

It is therefore recommended that either: a) further detailed investigations are undertaken prior to the appointment of a contractor to install the pipework; or b) sufficient allowance is made within the project's budget to allow for preliminary site investigations and route proving prior to commencing detailed design.

It is also recommended that contact is established with the British Wharf land owner(s) to ascertain whether it would be possible to install pipe in the soft dig area to the north of the Surrey Canal cycle path if required.

Finally it is recommended that a period of internal consultation is arranged so that all the relevant parties within LBL can discuss the delivery of the project. There are parts of the proposed route that are undoubtedly complex and will require the collaboration of different parties within the Council; for example if the pipe is to be installed in the soft dig perimeter of Folkestone Gardens. Ultimately, some sections of the route may require a degree of flexibility from the initial stated position in order to make the scheme possible.