DUBLIN DISTRICT HEATING SYSTEM
ENGINEERING REVIEW REPORT

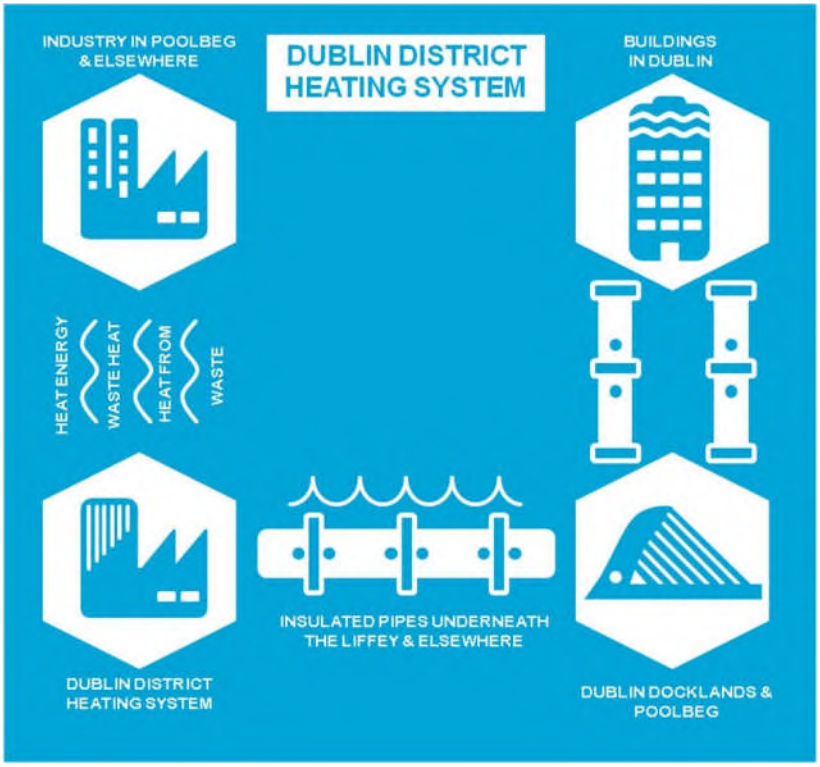
RAMBØLL

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

Intended for
Dublin City Council

Document type
Final Report

Date
June, 2019



DUBLIN DISTRICT HEATING SYSTEM
ENGINEERING REVIEW REPORT

Revision	**1c**
Date	**2019-06-03**
Made by	**IMC, CLABO, JNF**
Checked by	**JNF, HJH, EBA**
Approved by	**JEOH**
Description	**Engineering Report**

Ref	1100033276
Document ID	1040125-5 /

Ramboll
Hannemanns Allé 53
DK-2300 Copenhagen S
Denmark
T +45 5161 1000
F +45 5161 1001
www.ramboll.com/energy

CONTENTS

APPENDICES

Appendix 7
Existing Reports Reviewed

1. INTRODUCTION

Version 1a of this report was submitted in July 2018 to DCC. Following comments and discussion with DCC, addressing of submitted comments and finalising of this report was postponed until an instruction to proceed was given by DCC. No new information has been added since version 1a of the report was issued, however all comments previously raised are addressed herein.

Dublin City Council (DCC) is currently considering the next stages in the delivery of the Dublin District Heating System (DDHS). Ramboll were awarded the project "Dublin District Heating System Business Delivery Model and Engineering Review" to advise DCC on suitable business delivery options and complete a review of engineering issues and risks for the project. Nicholas O'Dwyer Consulting Engineers and DEVCCO are subconsultants to Ramboll on this project. This report addresses the review of engineering issues for the project.

The DDHS involves the development of a proposed District Heating System to recover and distribute waste heat primarily from the Dublin Waste to Energy (DWtE) Plant at Poolbeg Peninsula, Dublin, which has recently begun operations (Summer, 2017).

The geographical area of consideration for supply by the DDHS initially focuses on the Dublin Docklands Strategic Development Zone (SDZ), the Poolbeg West SDZ (PWSDZ), and the Poolbeg Peninsula as per the figure below.

Figure 1 Geographical area of consideration of the initial DDHS

On-going work has been completed on the DDHS since the first DH feasibility study was completed in November 2006, including the installation of physical DH infrastructure.

The DH infrastructure installed includes:

- **Liffey Services Tunnel**: This is approximately 300 metres from point to point. The internal dimensions of the supply and return pipes are Ø508mm (internal), while the external diameters are Ø710mm for the flow pipe and Ø630mm for the return pipe.
- **New "north south road"**: Installation of approximately 280m of 200Ømm internal diameter and smaller in the new "north south road" alongside the 3Arena
- **Mayor Street:** Approximately 248 metres of DH pipe was installed under Mayor Street, as follows;
    - DH Pipe installation of various sizes up to 400Ømm ID laid in Mayor Street Upper, Park Lane (or Spencer Street as noted in some documents).
    - DH pipes under the Luas crossing of Mayor Street and a new proposed street which is provisionally named Spencer Avenue.
- **New Wapping Street:** Twin 600mm pipe sleeves were installed under the LUAS for District Heating on the east side of the junction.
- **Castleforbes:** Space was left for future installation of DH pipes under the Luas crossing.

The objective of this report is to review, and update previous designs as required to a feasibility level of detail sufficient to;

i. Identify route selection options, including review of previous options and
ii. Specify the capacity of plant and equipment and pipe network for phased implementation.

The route selection outlined in this report considers the technical engineering, environmental, forecast demand and financial issues at a feasibility/outline design level of detail. The process conducted to develop this report is outlined in the figure below and will be discussed further in the following sections. The list of previous reports reviewed is included in Appendix 7.

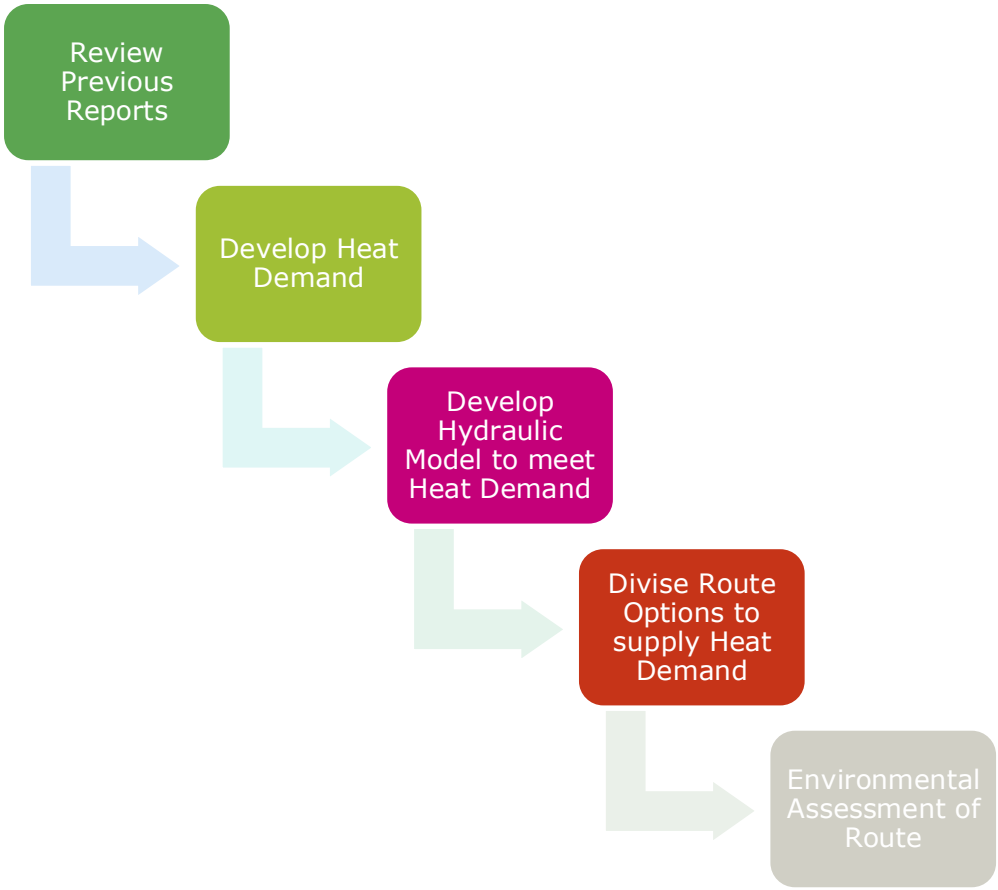


Figure 2 Engineering Report development process

2. HEAT DEMAND ASSESSMENT FOR PROJECT AREA

2.1 Heat Demand Phases

In order to assess the heat demand for the DDHS area it has been broken up into phases which are both geographically and temporally based, taking a linear progression in phase naming from the Dublin Waste to Energy (DWtE) plant at Poolbeg towards the Spencer Dock development in the North Lotts area. The figure below outlines the phases as they have been identified.

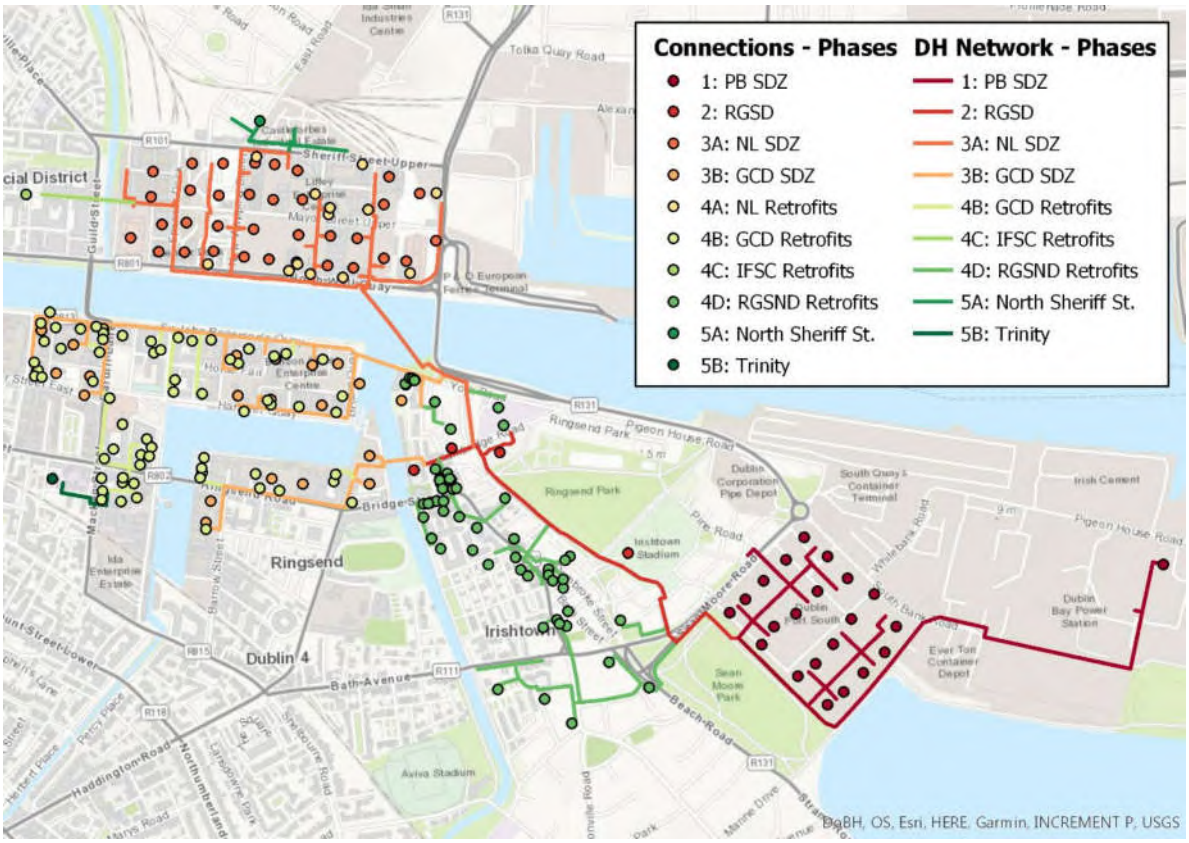


Figure 3 Outline of heat demand phases for DDHS

First Connectors

Phase 1-3B includes building demands which are expected to most likely connect to the DDHS from an early stage of its operation as identified in recent Codema[1] reports.

Phase 1 incorporates the Poolbeg area between the Waste to Energy plant and the Poolbeg West SDZ. Phase 2 includes the Ringsend area between the Poolbeg West SDZ and the southern shaft of the Liffey Tunnel. Phase 3A includes the North Lotts area. Phase 3B includes the Grand Canal Dock area.

Future Retro Fit Connections

Phase 4A-4D includes buildings which would need to be retrofitted to connect to the DDHS. These will be connected following the connection of the DH ready buildings, or if the business case is positive on a case by case basis.

[1] Dublin District Heating System Detailed Financial Appraisal (July, 2017), Dublin District Heating System Market Research Report (October, 2017)

Phase 4A includes buildings which could be retrofitted for DH supply in the North Lotts area. Phase 4B includes buildings which could be retrofitted for DH supply in the Grand Canal Dock area. Phase 4C includes buildings which could be retrofitted for DH supply in the IFSC area. Phase 4D includes buildings which could be retrofitted for DH supply in the Ringsend area.

Future New Development Connections

Phase 5A & B include areas of new potential future development with little available information on their plans or intention/requirement to connect to the DDHS. These will be connected following the connection of the DH ready buildings, or if the business case is positive on a case by case basis.

Phase 5A includes the area north of Sheriff Street behind the North Lotts area. Phase 5B includes the proposed Trinity College Technology Enterprise Campus development in the Grand Canal Dock area.

2.2 Heat Demand Development Process

To develop the heat demands for the DDHS, the following approach was followed.

First Connectors: Ramboll reviewed the studies[2] completed by Codema in 2017 to assess the methodology and approach conducted to develop the most likely heat demand for these consumers. This was found to be in line with best practice methodology as per the Danish heat planning process. Dublin City Council provided the raw data used to develop these reports and these demands were then incorporated into ArcGIS by Ramboll as can be seen in the figure below.

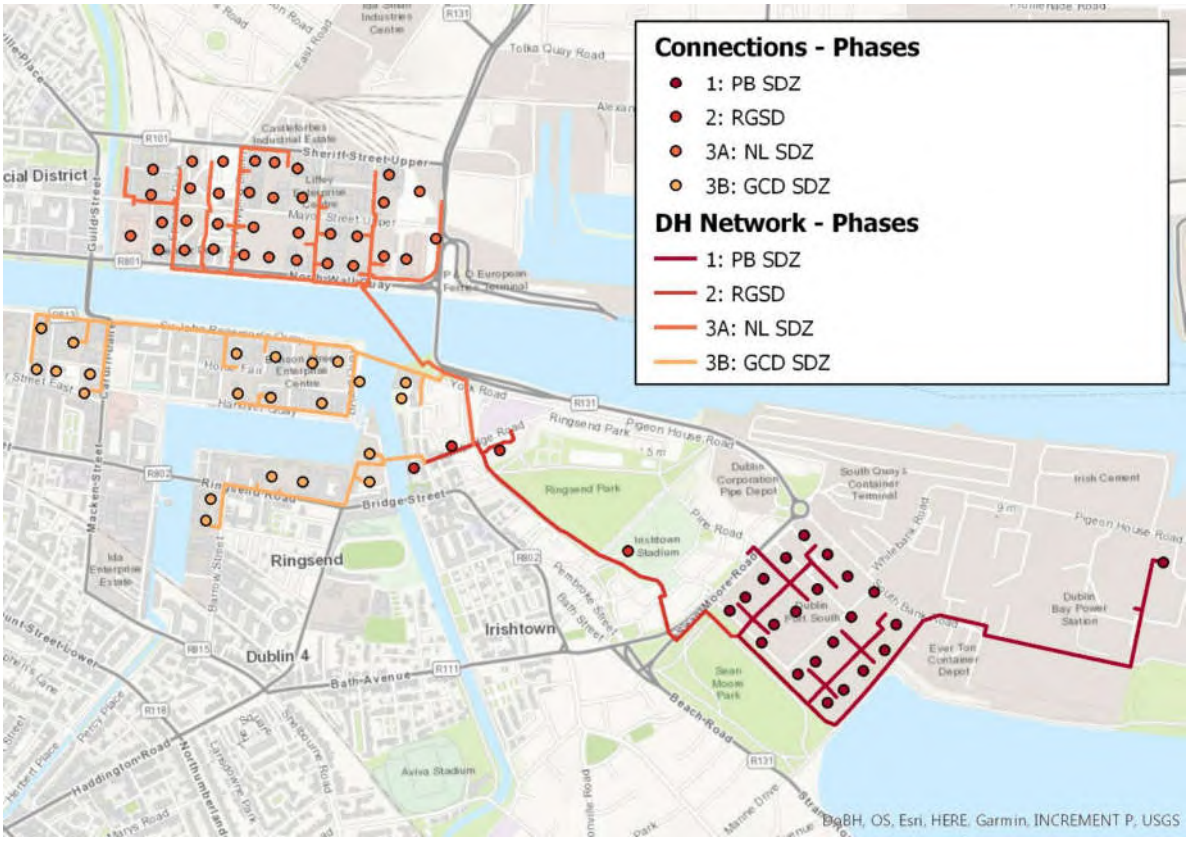


Figure 4 Heat demand locations identified for Phase 1-3B

[2] Dublin District Heating System Detailed Financial Appraisal (July, 2017), Dublin District Heating System Market Research Report (October, 2017)

Future Retro Fit Connections: Ramboll reviewed the studies completed by Codema in 2017[3] and 2012[4] which identified buildings which could potentially connect to the DDHS if they were retrofitted for this. The approach and methodology conducted to develop the demand for these consumers evaluated. This was found to be in line with best practice methodology as per the Danish heat planning process. Dublin City Council provided the raw data used to develop these reports and these demands were then incorporated into ArcGIS by Ramboll as can be seen in the figure below.

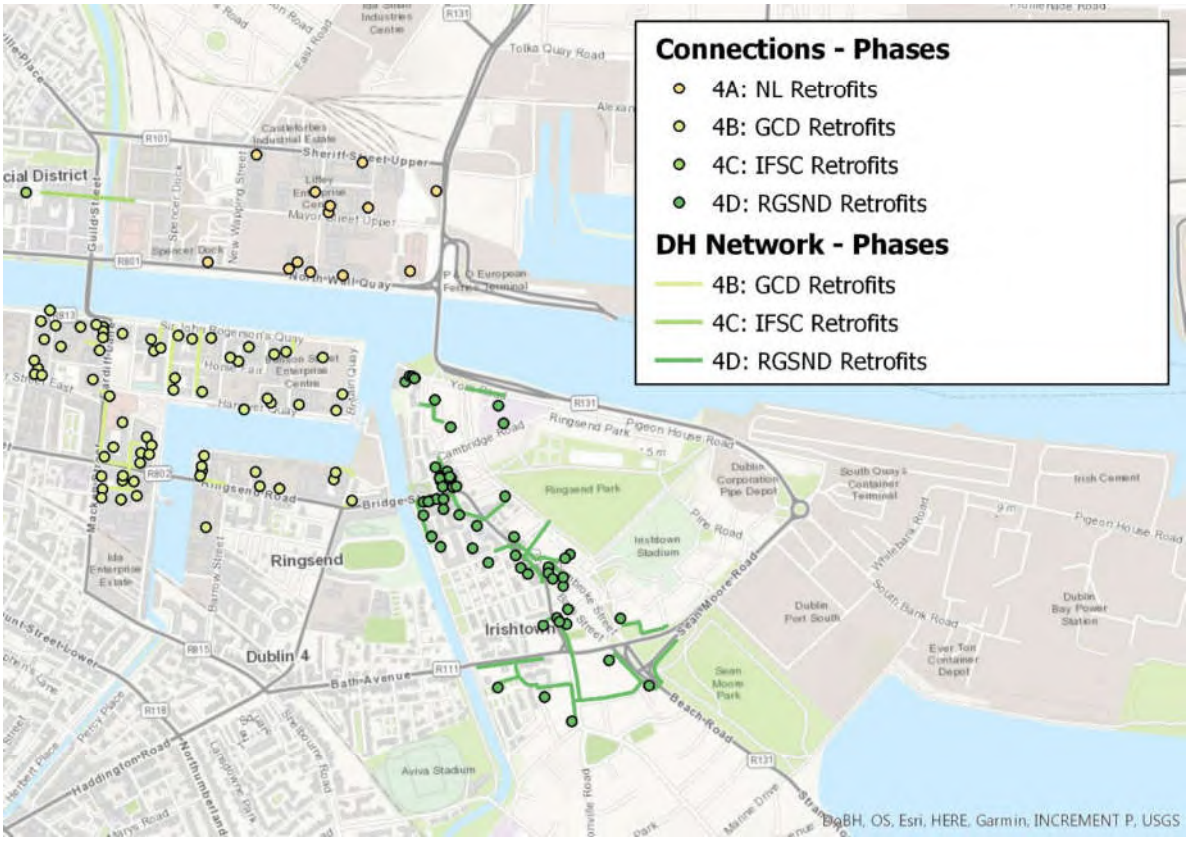


Figure 5 Heat demand locations identified for Phase 4A-D

Future New Development Connections: These developments include areas of new potential future development with little available information on their plans or intention/requirement to connect to the DDHS as they are outside of current SDZ areas. These will be connected following the connection of the DH ready buildings, or if the business case is positive on a case by case basis A high level estimation using relevant benchmarks[5] has been made for the potential demand for these areas to allow the network to be sized to accommodate future demands and to give an indication of the additional potential future loads for the network. Point loads have been assigned for these areas and they have been incorporated in ArcGIS by Ramboll as can be seen in the figure below.

Accumulated demand into one anchor load, assumptions on the estimated heat demand are described in the "Note" field. 50 kWh/m^2 and 2000 EFLH is used.

[3] Dublin District Heating System Detailed Financial Appraisal (July, 2017), Dublin District Heating System Market Research Report (October, 2017)

[4] Dublin District Heating System Market Assessment (December, 2012)

[5] 50 kWh/m^2 used for floor area. 5A floor area estimated based on 3 times plot ratio. 100,000 m^2 used for 5B.

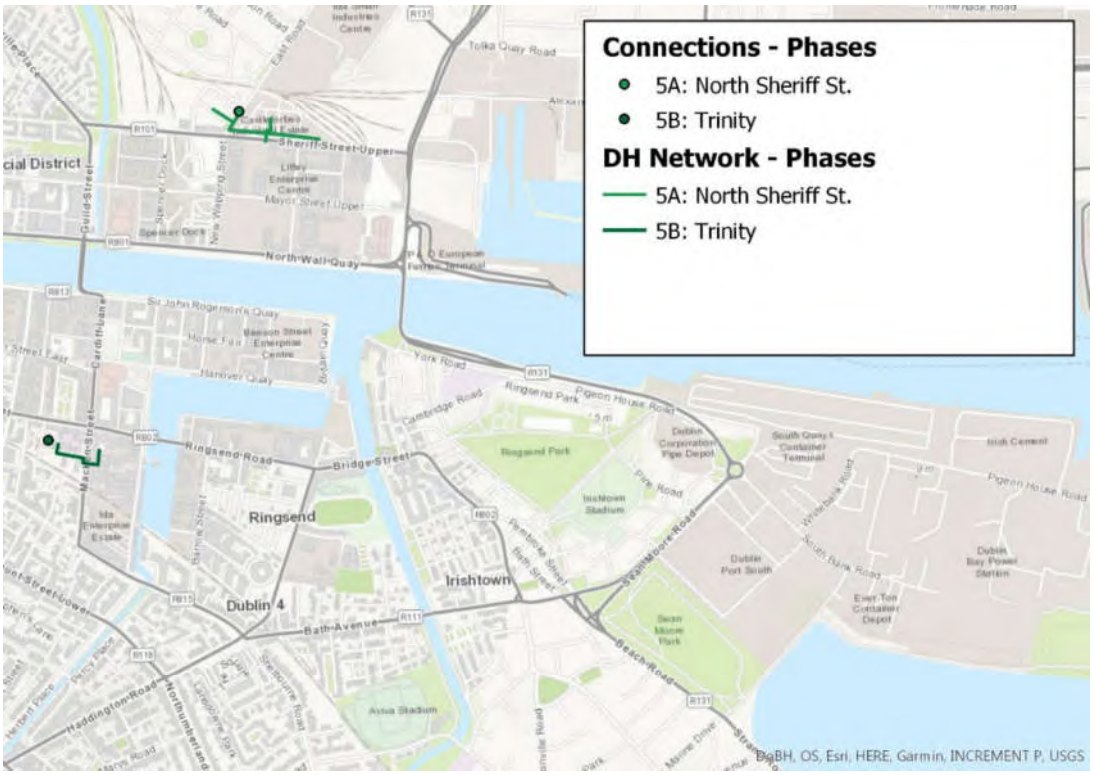


Figure 6 Heat demand location points for Phase 5A & B

2.3 Heat Demand

Based on the above, the demand in MWh for the DDHS is as per the below table.

Phase	Heat Demand (MWh)
First Connectors Phase 1-3B	
1: PB SDZ	27.945
2: RGSD	4.134
3A: NL SDZ	56.872
3B: GCD SDZ	24.633
Subtotal	**113.584**
Future Retro Fit Connections Phase 4A-4D	
4A: NL Retrofits	24.070
4B: GCD Retrofits	37.452
4C: IFSC Retrofits*	45.080
4D: RGSND Retrofits	41.923
Subtotal	**148.525**
Future New Development Connections Phase 5A & B	
5A: North Sheriff St.*	21.000
5B: Trinity*	5.000
Subtotal	**26.000**
Grand Total	**288.109**

***Accumulated demand into one anchor load.**

Table 1 DDHS Demand

The numbers in the table above are based on the Codema report mentioned in the note on page 5.

The locations for the heat demands indicated in the table above for the DDHS are shown in the figure below.

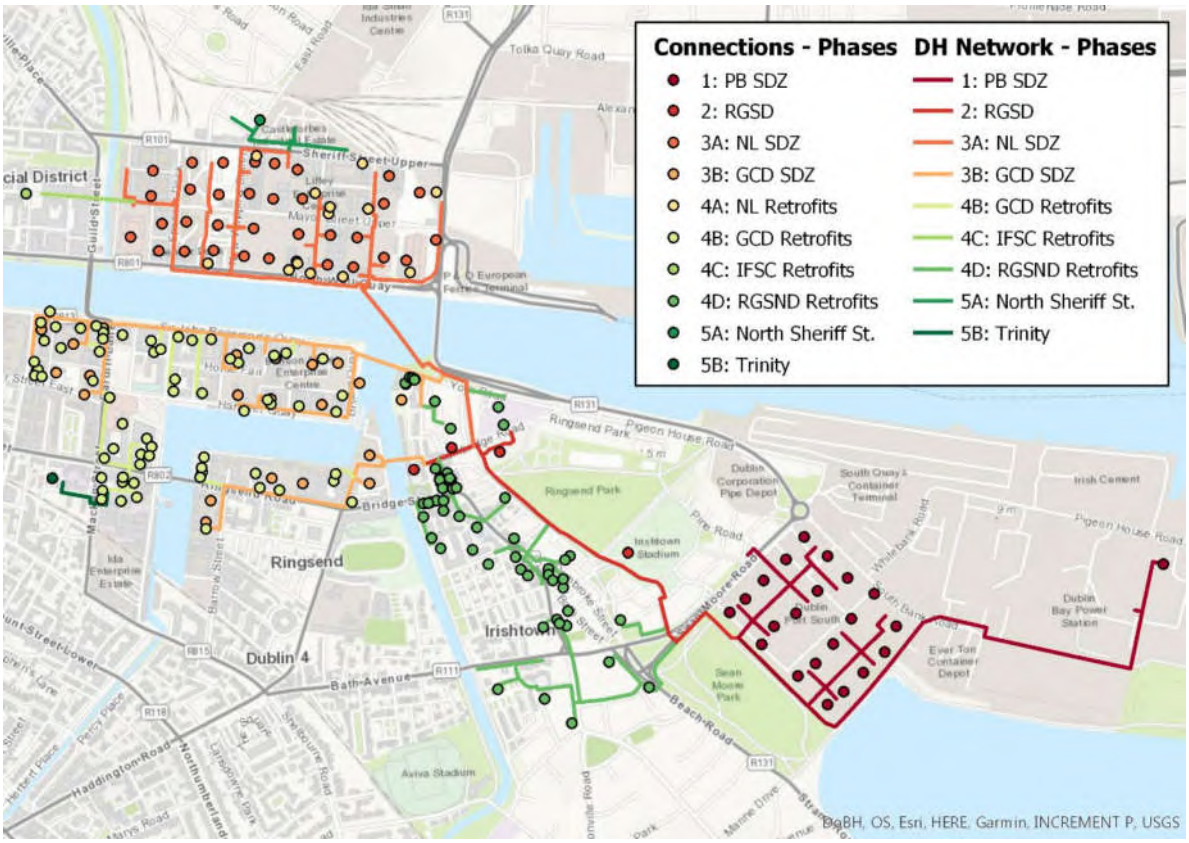


Figure 7 Heat demand locations for DDHS

3. HYDRAULIC MODEL DEVELOPMENT

3.1 Initial Modelling Process

A hydraulic model was developed to size the network and pumps appropriately to supply the estimated demand for the DDHS. Ramboll use two systems for hydraulic modelling, System Rørnet and Termis. Termis was selected for this process. Initially the heat demand for Phases 1-3B (the First Connectors as discussed in Section 2.1 above) was modelled for ease of comparison with previous studies which modelled the same areas to size the pipes.

Firstly, the demand was converted from MWh to MW capacity using an Equivalent Full Load Hour assumption of 2,000 hours. This provides the heat demand as shown in MW in the table below (without simultaneity). If simultaneity is included the capacity will be lower for each phase since the simultaneity factor takes into account, that not all consumers use their peak demand at the same time.

Phase	Heat demand (MWh)	Heat Demand (MW)
Phase 1: PB SDZ	27.945	14,0
Phase 2: RGSD	4.134	2,1
Phase 3A: NL SDZ	56.872	28,4
Phase 3B: GCD SDZ	24.633	12,3
Total	**113.584**	**56,8**

Table 2 Heat Demand Capacity for Phase 1-3b

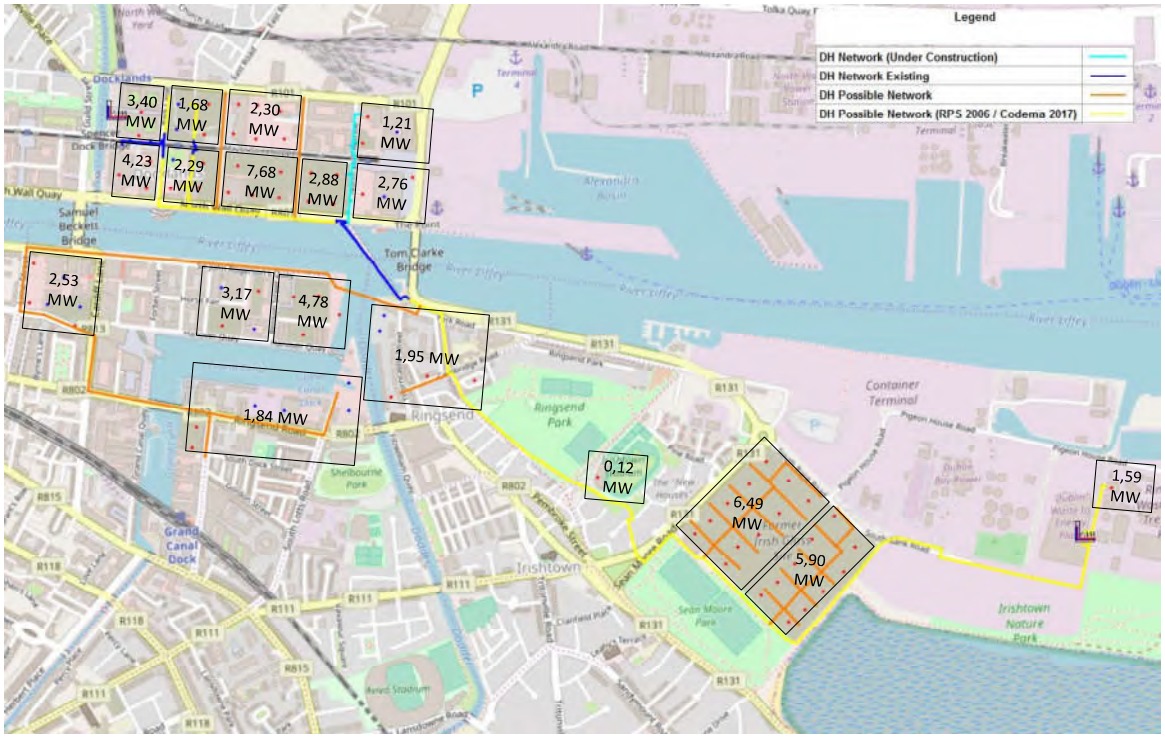


Figure 8 Heat Demand Capacity Map for Phase 1-3b

The model was then developed based on numerous drawings[6] completed previously for the DDHS.

Three Scenario were initially modelled to assess the network pipe dimensions and its operation once constructed. These were as follows:

- **Scenario 1:** Network dimensions as previously planned[7] (pipe sizes were designed for a peak load of app. 130 MW) to supply the 130MW demand indicated in Table 3.
- **Scenario 2:** Network sized to take the 90 MW capacity of the Waste to Energy plant to supply the 90MW demand indicated in Table 3
- **Scenario 3:** Network sized to supply the demand of 56,8 MW indicated in Table 3

The purpose of Table 3 is to illustrate the importance of designing the pipes for the correct peak load, bigger sizes are needed if the peak is higher, increasing the investment significantly. As can be seen from the below table, the length of the larger pipe dimensions reduce significantly between Scenario 1 and 3. In Table 3 the existing pipes and the pipes under construction are included.

	Scenario 1: As Planned ~ 130 MW	Scenario 2: DWtE ~ 90 MW	Scenario 3: Heat Demand ~ 56,7 MW
Pipe Dimension	**Meters of pipe**		
DN100/225	228	228	228
DN125/250	0	0	107
DN150/280	177	274	274
DN200/355	1350	1411	1411
DN250/450	1436	1542	1436
DN300/500	158	0	663
DN350/560	0	663	0
DN400/560	394	68	1377
DN450/670	0	0	1489
DN500/710	769	3123	325
DN600/900	2798	0	0
	7309	7309	7309

Table 3 Trench length per Scenario and pipe dimension

[6] TSD-DDHS2-008 to 013-REV0.pdf, DG0723C01.pdf, DG0724C05.pdf, mde0128DG0000D01.pdf, mde0128DG0020C01.pdf, mde0128DG0031I01.pdf

[7] Shown on drawing TSD-DDHS2-002-REV4

3.1.1 Dimensioning Criteria's

The pipe dimensioning has been based on the assumptions;

- Maximum acceptable pressure gradient: 120 Pa/m
- Maximum acceptable velocities:

Pipe Type	Velocity [m/s]
> DN40	1,0
DN50 <> DN150	1,5
DN200 <> DN250	2,0
DN300 <> DN350	2,5
DN400 <	3,0

Table 4 Assumed maximum velocities per pipe dimension size

3.2 Results of Initial Modelling

Each scenario was further tested under 3 further conditions, (i) no simultaneity, (ii) simultaneity of 0,7 (expected during normal operation) and (iii) simultaneity of 0,3 (expected during summer period). Further details of the analysis can be found in Appendix 1.

Scenario 1

Under this scenario (i) above (we assume), the pressure in the system is very low under all hydraulic scenarios analysed which are described in appendix 1 with flow velocities of max 0,9 m/s (during normal operation) and max 0,4 m/s (during summer period). This can result in operational issues for the network and poor supply to consumers, especially those at the furthest distance from the DWtE plant.

Scenario 2

Under this scenario, the pressure in the system is also very low under all scenarios with flow velocities of max 1,2 m/s (during normal operation) and max 0,5 m/s (during summer period).

Scenario 3

Under this scenario, which is illustrated in the figure below, the pressure in the system is better with higher velocities of flow, however there is room for further optimisation. In Scenario 3 the network has been designed for the expected heat load ~ 56,8 MW (Table 2 on page 8). The main pipe from the DWtE to the Liffey tunnel can be reduced from the planned DN600 to DN450 this will mean that the velocities will be increased to approx. 1.5 m/s in peak operation and approx. 0.7 m/s during summer operation. The maximum pressure in the system will however stay lower than the design pressure in all hydraulic scenarios. All scenarios are further described in appendix 1.

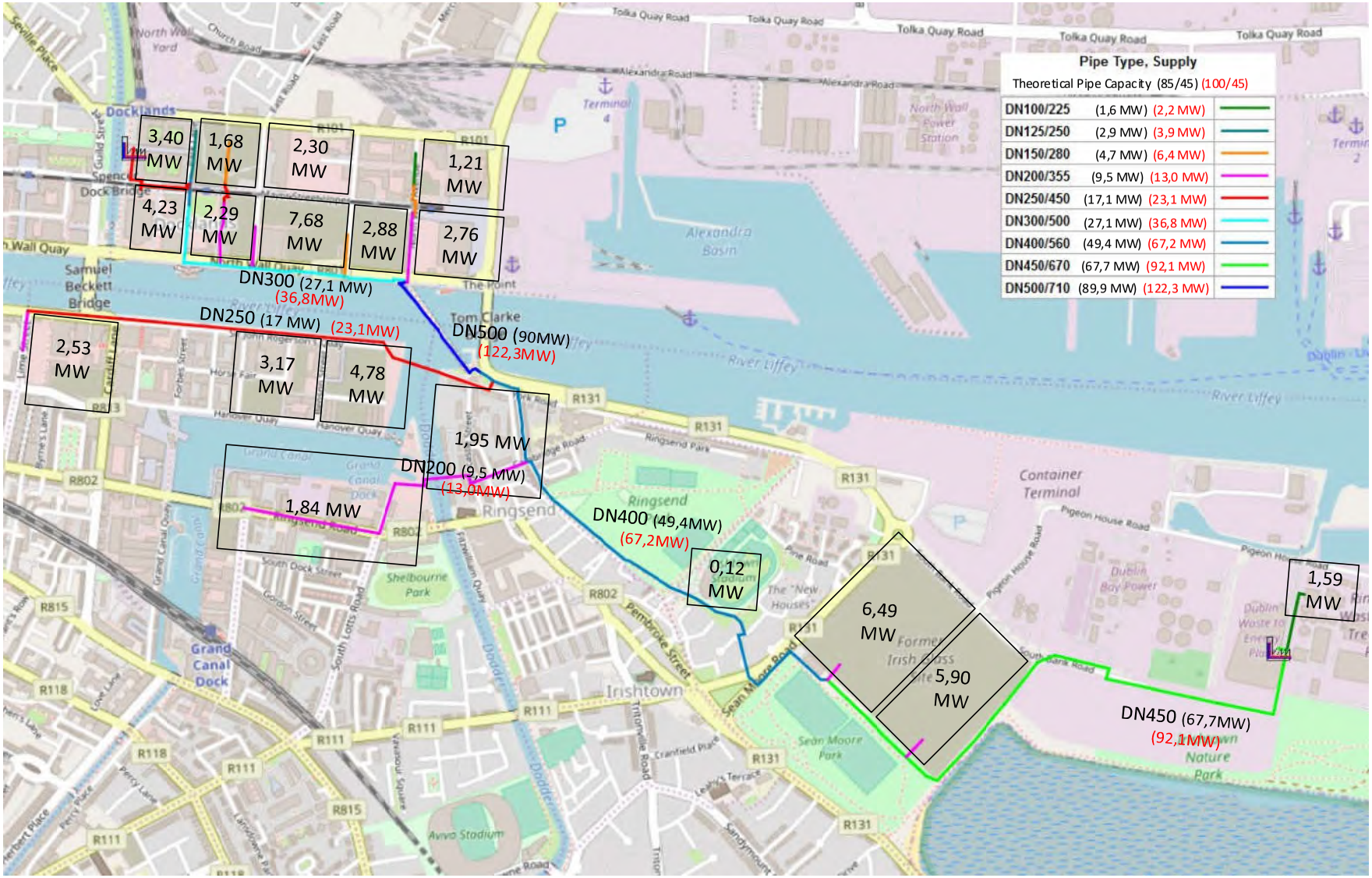


Figure 9 Scenario 3 pipe optimisation

3.3 Second Phase of Hydraulic Modelling

Phase 1-3B represents less than half of the available capacity at the DWtE plant. As a result, DCC requested that additional potential loads be considered to ensure the pipes had available capacity to supply other future potential developments which may occur. As a result, the demands developed for Phase 4A-5B were included into the hydraulic model.

Phase	Heat demand (MWh)	Heat Demand (MW)
Phase 1: PB SDZ	27.945	14,0
Phase 2: RGSD	4.134	2,1
Phase 3A: NL SDZ	56.872	28,4
Phase 3B: GCD SDZ	24.633	12,3
4A: NL Retrofits	24.070	12,0
4B: GCD Retrofits	37.452	18,7
4C: IFSC Retrofits*	45.080	22,5
4D: RGSND Retrofits	41.923	21,0
5A: North Sheriff St.*	21.000	10,5
5B: Trinity*	5.000	2,5
Total	**288.109**	**144,1**

Table 5 Expected Heat Demand per phase

* Accumulated demand into one anchor load, assumptions on the estimated heat demand are described in the "Note" field. 50 kWh/m2 and 2000 EFLH is used.

3.3.1 Results

In the second phase of the modelling the level of detail has been increased to perform a more accurate estimate of CAPEX. The pipe sizing has been based on a simultaneity of 0,7 ~ (expected during normal operation). To reduce the CAPEX and optimising the operations of the network the main pipe from the DWtE to the Liffey Services tunnel has been designed with higher velocities than the remaining network. By accepting velocities up to 3,5 m/s and pressure gradient up to 210 Pa/M the main pipe from the DWtE to St. Brendan´s Cottages can be a DN450 and from St. Brendan´s Cottages to the Liffey Tunnel a DN400.

In the hydraulic model heat distribution has been distributed between;

- DWtE ~ 90 MW
- Peak Boiler ~ 12[8] MW at Spencer Dock Bridges

DWtE:

- Power (heat): 90,5 MW
- Flow: 1960 m^3/h
- Supply temp.: 85 °C
- Return temp.: 45 °C
- Pump head: 14,8 bar (incl. 1,5 bar internal loss in boiler)

Peak Boiler, at Spencer Dock Bridges

[8] Assumed capacity of boilers at Spencer Dock development. Used to demonstrate benefit of having a peak load boiler on north side of Liffey tunnel

- Power (heat): 12,0 MW
- Flow: 260 m^3/h
- Supply temp.: 85 °C
- Return temp.: 45 °C
- Pump head: 3,4 bar (incl. 1,5 bar internal loss in boiler)

Network:

- Max. press.: 14,3 bar(g)
- Min. press.: 1,0 bar(g)
- Min. ΔP: 1,0 bar (Sheriff Street Upper)
- Max. velocity: 3,5 m/s
- Max. press. Gradient: 205 Pa/m

In the figure below the pipe sizes for Dublin DH network are illustrated. Pipes smaller then DN100 are illustrated as thin black lines to simplify the illustration.

Figure 10 Illustration of pipe sizes, pipes smaller than DN100 illustrated as thin black lines.

In Table 6 the trench length in meters of each pipe dimension is listed.

Pipe Dimension	Meters of pipe
DN020/110	558
DN025/110	598
DN032/125	538
DN040/125	601
DN050/140	968
DN065/160	764
DN080/180	806
DN100/225	904
DN125/250	1979
DN150/280	957
DN200/355	1079
DN250/450	1428
DN300/500	515
DN350/560	115
DN400/630	533
DN450/670	2231
DN500/710	0
DN600/900	0
Sum	14573

Table 6 Trench length of Dublin DH network for CAPEX. The table does not include the existing pipes.

4. PIPE ROUTE SELECTION

This section outlines route options for the DH network to supply the demand shown in the previous section from the DWtE plant. The route selection process has involved:

- Review of previous drawings and engineering reports developed for the DH network
- Review of previous SI works completed for the area
- Review of updated utility drawings supplied by the respective utilities
- Risk workshop on the route options with DCC Dockland engineers
- Meetings on the route with Transport Infrastructure Ireland
- Meetings with Covanta and site visit to assess route options off the DWtE site
- Evaluation of multiple risks affecting the route, including environmental, ground conditions, land acquisition requirements, planning requirements, traffic disruption, affects on local residents among many others which are elaborated further in the Risk section of the Business Model Report.

The routes illustrated consider further the design requirements of a DH network and associated constructability and network lifetime. DH networks are different from other utilities in their design in that they expand and as a result move with the heat they supply. This requires consideration for changes in direction or elevation, branch points, length of proposed bends in pipe and where expansion can be dealt within the network. Designs and installations which consider these criteria and take into account the impact of same will achieve a longer network lifetime (in excess of 50 years). When these design criteria are not considered, bursts are likely to occur earlier in the networks lifetime, leading to the need for further network investment.

The suggested routes are developed to a pre-feasibility level of detail and will require further proofing at design stage. Alternative route options are indicated in the drawings, however these will also require further investigation to ascertain the benefits of one route over another. The proposed DH pipe route is split over 5 drawings due the length of the route and the respective phases discussed in Section 2 above. Screen shots of each drawing is included below for reference, however the full size drawings are included in Appendix 2.

4.1 Phase 1: DWtE to PW SDZ

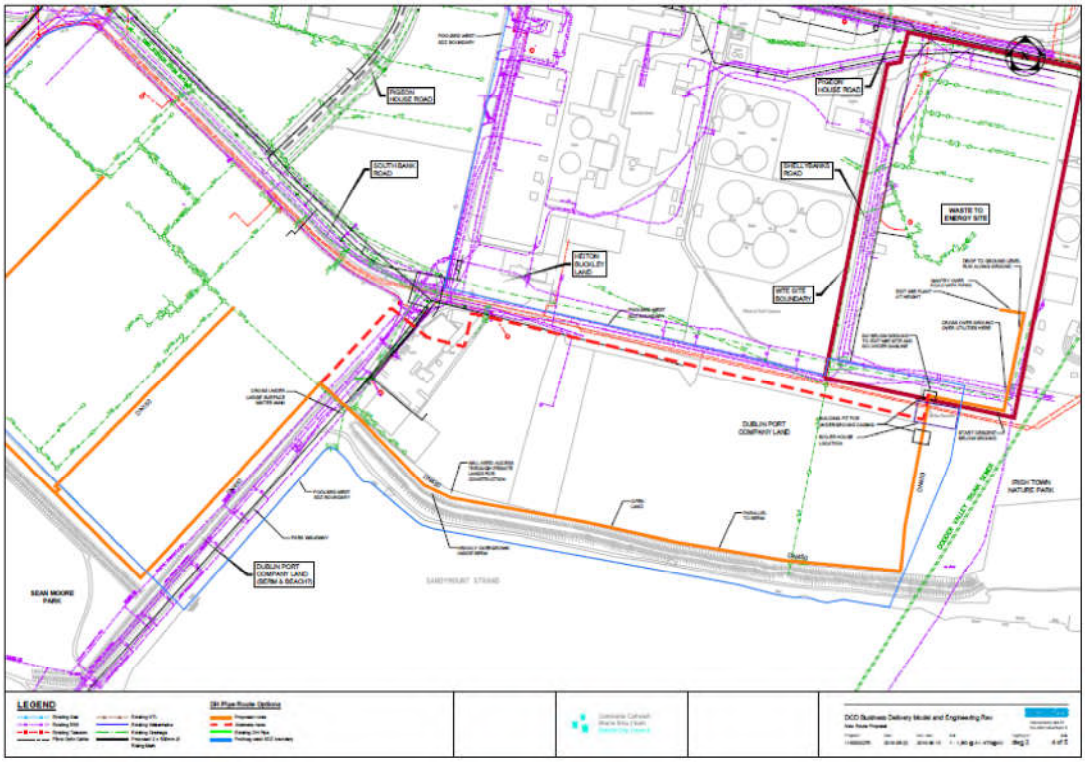


Figure 11 DWtE to PW SDZ

The DH pipes (shown as a single orange line above) leave the DWtE at their existing elevated level using a gantry to cross the service road to the east of the DWtE plant. At this point the pipes descend to ground level and travel south to the site boundary. The pipes then turn west and descend below ground level in order to exit the DWtE site. It is initially proposed to use mini tunnelling with twin pits to cross under the twin gas mains south of the DWtE site boundary.

Further SI work and discussions with the utilities are required for this crossing to ensure no other utilities will be encountered at where the mini tunnel is proposed. Equally, exact space requirements between the twin syphon sewers and the DWtE site boundary need to be determined.

The pipes then exit the site in the mini tunnel pit within the Poolbeg West SDZ. If the Peaking and Back Up boiler is to be located here, then the pipes will then connect to this. An alternate route (shown in dashed red lines) is proposed at this point if environmental requirements stipulate that the DH network construction should be as far away from the SAC as possible.

The proposed route indicated here is however the preferred route due to limited potential for utility conflicts and space for easier construction. The network shown in the PW SDZ is along two assumed roads and is likely to change. This will also affect the assumed network length for the PW SDZ indicated in the hydraulic analysis in Section 3, but this is likely to be a small change in the expected pipe length.

4.2 Phase 2: PW SDZ to the Liffey Tunnel

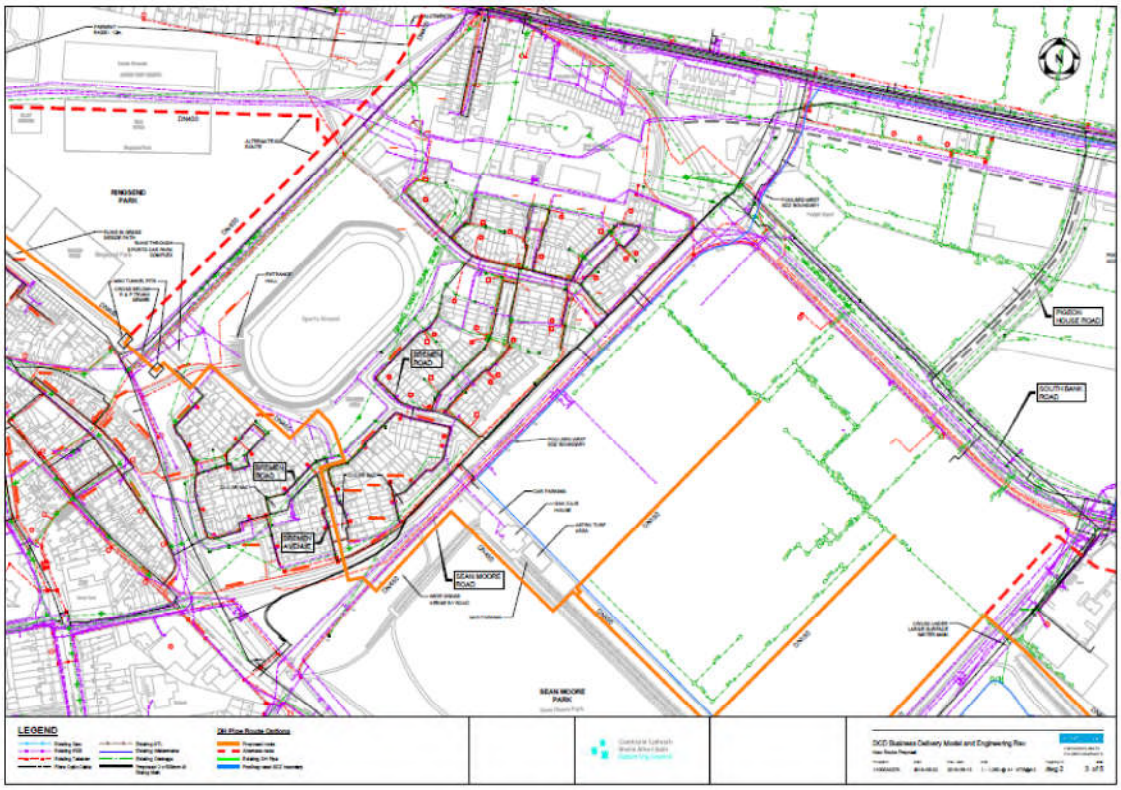


Figure 12 PW SDZ to Ringsend

The network installed in this phase connects the DWtE supply to the North and South Docklands demand in Phase 3A and 3B and is split over two drawings shown above and below. Currently there are limited consumer connections expected along this route.

A complex crossing is required for the Rathmines and Pembroke Sewer line crossing at the Ringsend Park. Mini tunnelling is proposed for crossing this, however further SI works and design is required here to determine exact method for crossing. Following this crossing the network is proposed to run north west within the Ringsend Park to towards the Cannon Mooney Gardens flats.

At the junction at Cannon Mooney Gardens, the network splits and goes north east and south west along Cambridge Road. It had previously been considered to run along Pembroke Cottages, however concerns have been raised about construction vibrations and the potential impact on the cottage foundations in this narrow street.

The north east section of piping then crosses York Road and continues west parallel to York Road to the Liffey tunnel Shaft. The south west section travels along Cambridge Road and then between O'Rahilly House and Whelan House flats. A mini tunnel is proposed to cross the River Dodder at this point to supply the South Docklands area. Further investigation and stakeholder engagement is required to determine the exact crossing point and construction method between these buildings due to the location of high voltage electrical cables in the vicinity, the existing building foundations and the future plans for development of the open spaces in these complexes. Relevant stakeholders for consultation at design stage will include Waterways Ireland, ESB High Voltage, Dublin City Council Housing Maintenance and DCC Planning depts. Thorncastle Street has been considered as a route to go north to the Liffey Tunnel shaft however, construction will be very difficult in this narrow street and so it is not selected.

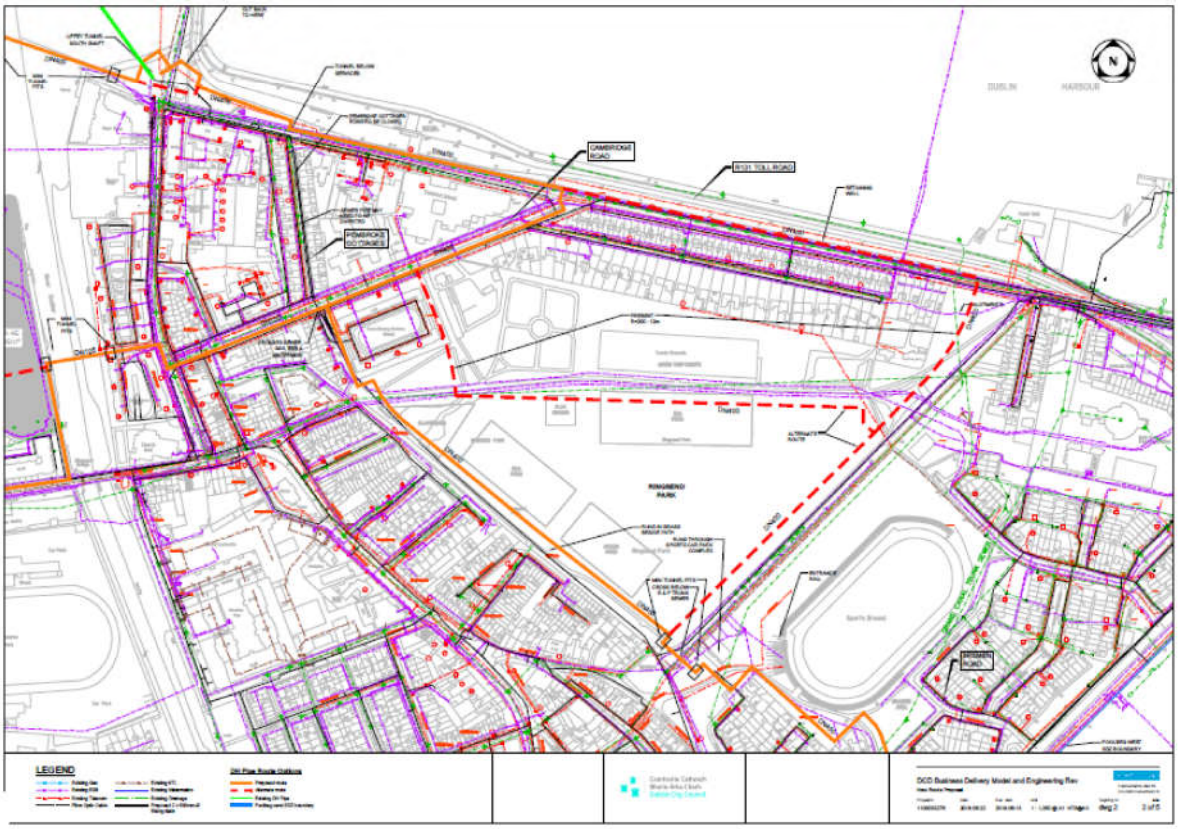


Figure 13 Ringsend to the Liffey Tunnel

Two alternate routes are shown for this section of the network. These take into consideration potential conflicts with the proposed Luas corridor in this area and local residents objection to the route currently proposed within the park which may impact the entrance to the Cannon Mooney Gardens flats. Both alternative routes branch north east after the R&P Sewer crossing with one crossing Pigeon House road and turning north west to travel parallel and south of the retaining wall there towards the Liffey Tunnel shaft.

Another alternative route is shown around the south Liffey Tunnel shaft. The landscape of this area of the route in the vicinity of the tunnel shaft is expected to change due to infrastructure projects proposed for the area. These include but are not limited to: the new River Dodder bridge; the new Luas line and; the Southern Port Access Route. The final routing and design of the DH network will need to be done in coordination with each relevant designer for these projects as appropriate at the time of design. Ideally the DH network design and installation should be incorporated into these other infrastructure projects as appropriate. This will reduce overall infrastructure projects capex costs and the impact on traffic and local residents due to multiple construction projects.

4.3 Phase 3A: North Docklands

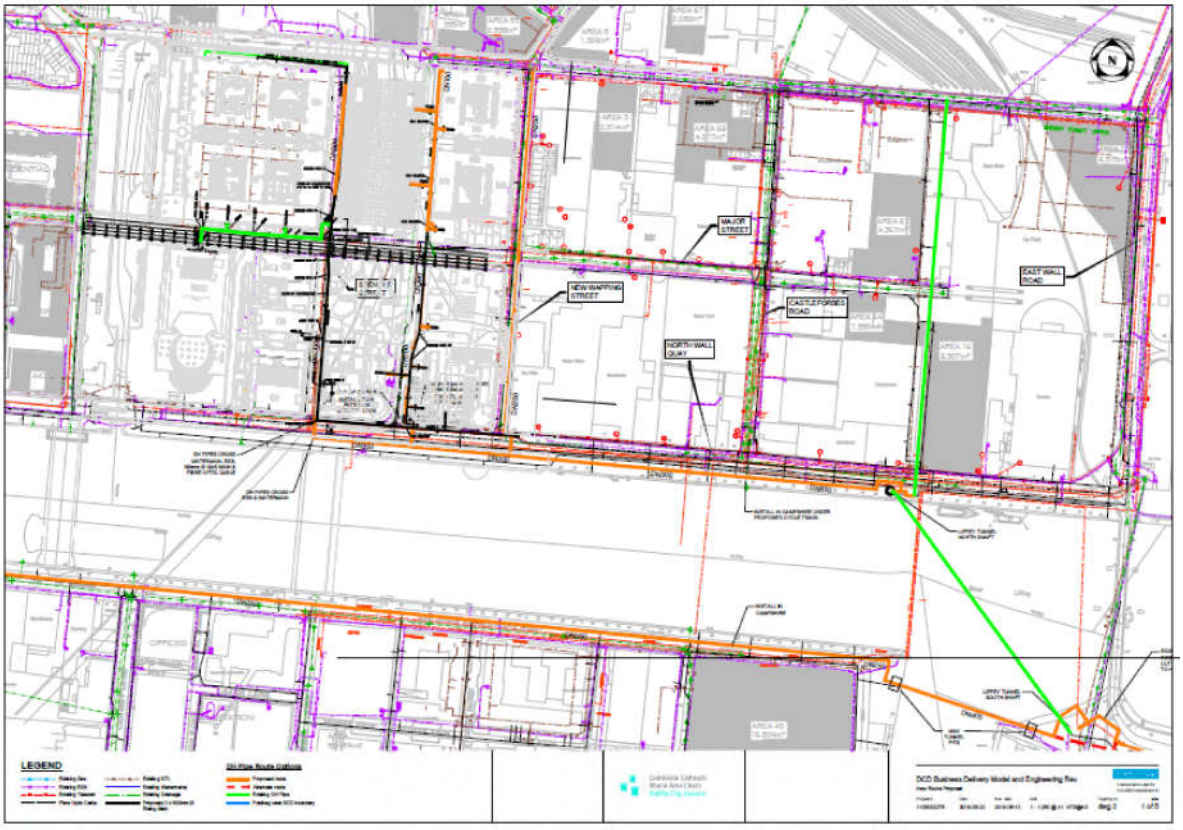


Figure 14 Liffey Tunnel to North Docklands

The North Docklands pipe routing is similar to that previously proposed. Significant changes include the pipe from the North Shaft of the Liffey Tunnel which now runs west within the Campshires. Roughan and O'Donovan Consulting Engineers have completed as assessment for Dublin City Council and concluded the DH piping can be installed along the Campshires underneath the proposed cycle path for this area. This proposed construction route should limit impact on the traffic along North Wall Quay.

The network proposed for New Wapping Street is sized to supply the area north of the North Lotts, Phase 5a, and would continue north of the network shown in the drawing above. Another change from the previous routing proposed is the removal of the pipe along Castleforbes Road. This is a very congested street and the piping installed on the "new road" and proposed for New Wapping will be sufficient to supply the developments in between these roads without another pipe along Castleforbes.

Open cut construction is proposed for all of the North Docklands area. Mini tunnelling or directional drilling may be necessary for crossing of the North Wall Quay. Further SI works will be required for the detailed design phase.

4.4 Phase 3B: South Docklands

This section of the route connects the South Docklands area to the DWtE plant. Two significant crossings are included here, both of the River Dodder. Mini tunnelling is currently proposed for both crossing. The northern crossing of the River Dodder should be coordinated and if possible included within the proposed construction for the new River Dodder bridge currently under design. This is a complex crossing point for the DH network which will be further complicated by the construction of the new lifting bridge here. Coordination and combination of these infrastructure projects will have

positive impacts with regard to overall projects capex and disruption time due to the construction on local residents and traffic.

Following this northern crossing point of the River Dodder, it is proposed to install the DH network in the Campshires along Sir John Rogerson Quay. Roughan and O'Donovan Consulting Engineers are currently conducting a similar analysis as was done for the North Wall Campshires for the Sir John Rogerson Quay Campshires which should clarify this proposal further.

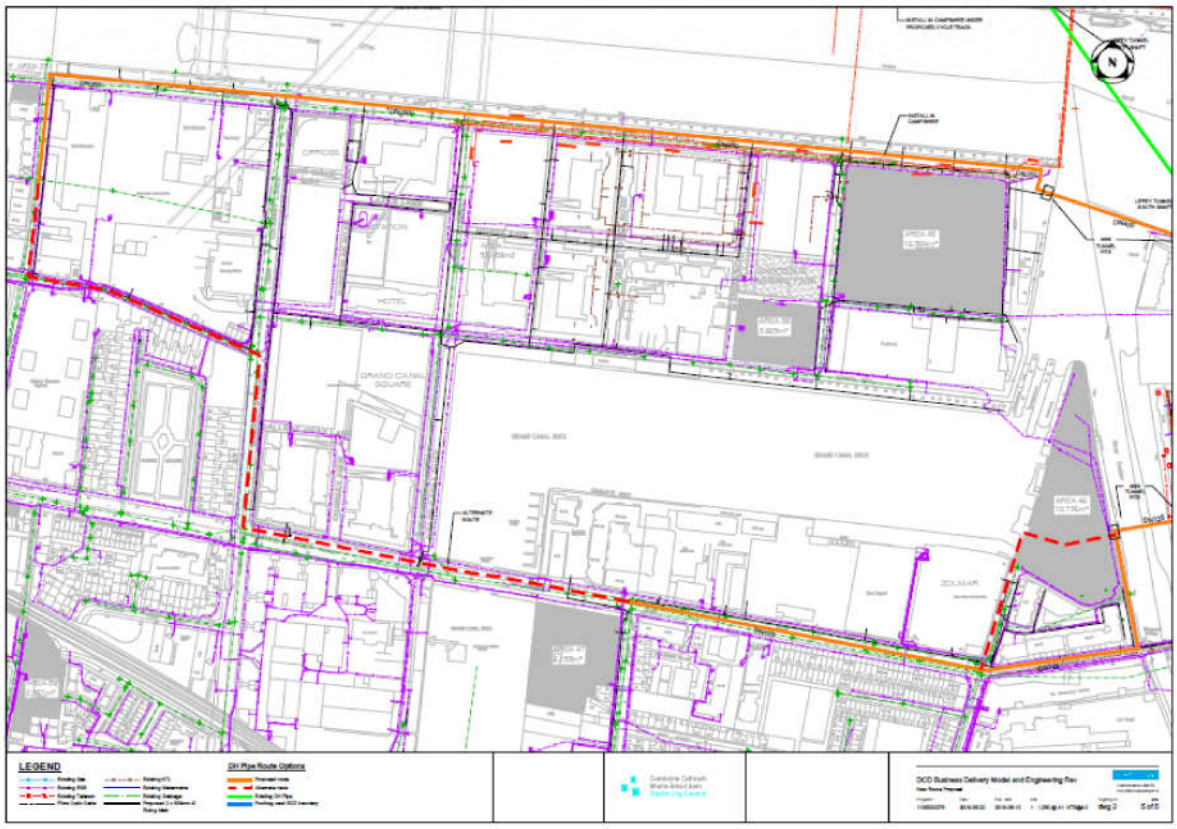


Figure 15 South Docklands network

The southern crossing point of the Dodder River is proposed as a mini tunnel as the existing Ringsend Bridge has no space to accommodate the DH pipes and it is not possible to attach piping to the bridge as it is a protected structure. Further SI is needed in the area at the detailed design stage.

An alternate route is shown in this area if the southern crossing point is not possible. This currently would add additional network length of network without connected consumers, however if additional customers propose to connect, such as the new campus proposed for Trinity, it would improve this.

Pearse Street is a heavily trafficked road with associated restrictions which will impact when construction can take place for the DH pipe. However, the pipe size proposed for this street is relatively small and solutions which can reduce traffic impact should be designed to ensure this at the detailed design stage.

5. SYSTEM DESIGN CONSIDERATIONS FOR THE DDHS

5.1 DWtE

It is expected that more than 90 % of the heat demand will be supplied to the DDHS from the Dublin Waste to Energy facility (hereafter "DWtE") at Poolbeg. The heat capacity of the plant is approx. 90 MW whereas the needed peak heat capacity to the network for phase 1 to 3B will be approx. 57 MW provided a 100 % connection rate to the system.

The average hours in operation of the plant on annual basis is not known, but normally this type of plant will be in operation approx. 8,000 to 8,400 hours per year. It needs to have a planned overhaul once per year. The duration of the outage will vary from year to year and depend on the operational hours for each of the vital plant parts (such as boiler parts, steam turbine parts etc.). Furthermore, it will have unplanned outages of short duration (hours to a few days).

When the DWtE plant is not in operation, the heat will alternatively be supplied from either tank thermal energy storage or from backup boilers. The backup boilers should always have adequate capacity for supplying when the largest unit intended or unintended is out of operation.

The 57 MW is estimated without taking into consideration that the maximum demand for heat will not occur for all consumers at the same time. To take this into account and thereby avoiding significant overinvesting in network sizing and production capacity, a so-called diversity factor is multiplied on the peak capacity. From experience, this factor is 0.7 and thus the maximum capacity can be reduced from 57 MW to approx. 40 MW. Thus, there is significant additional capacity in the DWtE facility to further supply other consumers in Dublin.

Today, the heat from the DWtE plant is cooled using the Liffey River with focus on production of as much electricity as possible. Therefore, the steam in the turbine is extracted when it has a very low pressure and temperature to produce as much electricity as possible. If district heating should be supplied it will be necessary to extract heat from another extraction point in the steam turbine, at a higher pressure and thus at a higher temperature adequate for heat production. Thus, extraction of heat from the facility will be at a cost of avoided production of electricity.

The extraction from the DWtE facility is designed for 120 °C. However, it is recommended that the heating network is designed for lower temperatures – from maximum 95 °C to approx. 65-75 °C as the lowest supply temperature during summer. This could be between two extraction points in the steam turbine and might therefore be a challenge for the steam turbine. The DWtE operator should confirm if it is possible.

There is a large difference in supplying the electrical grid (in which the DWtE facility is a very small producer) to supplying to the district heating network (in which the DWtE would be the main producer). It is our experience that this might result in fluctuating heat output which will need to be addressed in the heat purchase agreement with DWtEL and in the design to mitigate this.

The existing DH network components installed at the DWtE today includes the condensers located adjacent to the turbine hall and the piping from these to the District Heating Area (DHA) within the DWtE. A sketch of this area provided by DCC is included in Appendix 3. Based on this sketch there is sufficient space to include the required production pumps for the network, however there is not sufficient space for thermal storage in the DHA.

Space for power supply and frequency converter installation, if not installed in another location in the DWtE, is available along the wall area beside the allocated DHA based on this sketch.

5.2 Peaking and backup boilers

As mentioned, more than 90 % of the necessary heat can be provided from the DWtE plant with the remaining from peaking and backup boilers.

The peaking and backup boilers should be based on a very reliable technology since the requirements are that they should to be able to go into operation within minutes, if the DWtE is out of operation unplanned during the winter time. The limited operation of the boilers per year and necessary high capacity for the boilers requires that the boilers should be based on a low capital expenditure technology. Natural gas boilers have these characteristics. They are very reliable and the CapEx is very low for these boilers.

There is always the question of how many backup boilers are needed. If the DWtE facility is out of operation unplanned for several days during winter time and suddenly a backup boiler fails, it can be difficult to supply the necessary heat. A thermal storage would mean that there is more time to repair the backup boiler, but since backup capacity, as mentioned, has very low CapEx, it is recommended to have at least two boilers with one as backup for the other. Thus, it is recommended always to have 2 x 100 % backup for the main plant (DWtE). With 100 % backup, it is meant that one boiler can cover all the actual demand for heat. Peaking and backup capacity can easily be phased as the heat demand develops. Also, the peak / backup capacity can be split between several locations.

How many separate locations necessary for backup plants to the district heating system depends on the risk of a situation with an unplanned outage of part of the system. If e.g. there is a risk of outage of part of the district heating system, consumers "behind" this point should still have heat supplied and thus there is a need for a backup boiler system.

In the following we will assume that the main peaking and backup plant (in the following section) always will be able to supply the entire development area of phase 1 to 3B.

If a peaking and backup plant is located near the main supply it will be necessary to design the main pipes in the network for full peak capacity which occurs for very few hours per year. Therefore, it can be very expensive for the network. In Denmark peaking and backup plants are often located at the "end point" of the district heating network to reduce network costs. Since the locations for potential backup plants are not fully known (in the "ends of the system") i.e. Docklands North and South, the network is designed for full capacity to each of the phases in the project in the expectation that the network will be extended in a subsequent phase.

5.2.1 Main peaking and backup plant

It is recommended to have a main peaking and backup plant south of the DWtE facility. The building should include the following:

- Natural gas boilers with adequate capacity for supplying phase 1 to 3B
- Space for later building out of the boiler capacity
- Control room for the operational staff for the entire district heating system
- Staffing facilities such as toilets, offices, lunch facilities, changing rooms etc.
- Room for electric supply of equipment
- Outside location for the heat thermal storage
- Pumps for the district heating system
- Outside space for car parking etc.

It should furthermore be considered to include space for potential visitors to the facility. This will be one of the first district wide district heating systems in Ireland and will most likely attract much attention.

Capacity
The total necessary peak capacity for supplying phase 1 to 3B is approx. 57 MW without diversity and 40 MW incl. diversity. With the assumption that it is always possible to supply the entire network with heat from this plant, it is recommended to end up with 2 x 40 MW backup capacity. This will be the solution with by far the lowest capital expenditure compared to separate backup plants located respectively at 3A and 3B.

Thermal storage and pressure holding
The design temperature for the district heating system is recommended to be 95 °C but the maximum operational temperature in the district heating system should be approx. 85 °C in the winter time. As it will always be below 100 °C, it is possible to have a pressure-less heat thermal storage with a very simple connection to the district heating system and thus with low CapEx costs as sketched in the following figure.

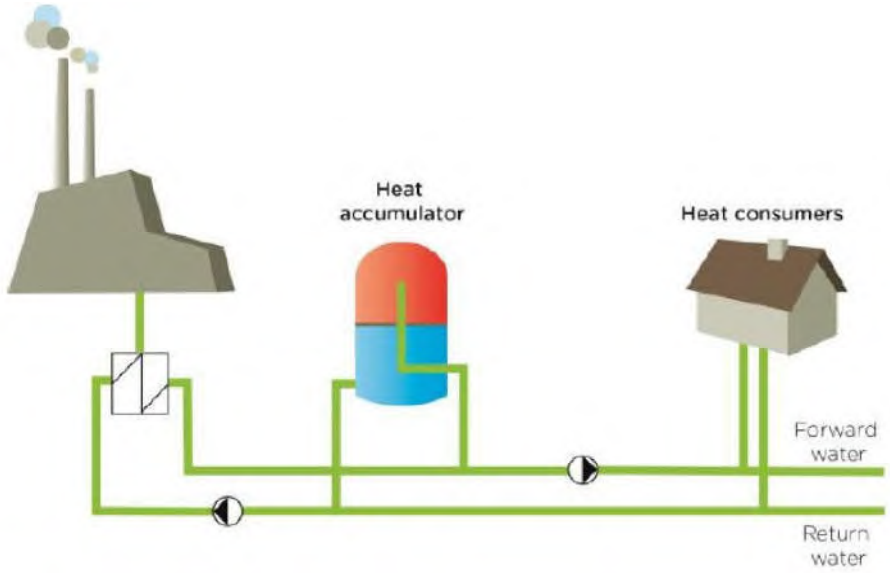


Figure 16 Simple thermal storage connection for DH system

The function and capacity of the thermal heat storage is discussed in the business model review report.

Pumps
As indicated on the illustration above there is need for two sets of pumps:

- "Production pumps", which are controlled by the supply temperature in the extraction
- "Consumer pumps", which are controlled by the pressure difference in the district heating network

It is recommended that the production pumps are located in the DWtE facility whereas the consumption pumps are located in the new peaking / backup plant with the heat storage tank.

The production pumps should be designed for the maximum required charging of the heat storage tank whereas the consumption pumps should be designed for the maximum capacity in the network i.e. the production pumps will have high flow/low pressure and the consumer pumps will have low flow/high pressure.

It is recommended always to have backup a pump. Since the final heat demand and the connection rate is uncertain it is furthermore recommended to have a pump strategy that avoids too low operation on a pump and thereby reduced efficiency. Thus, we will recommend having 3 x 50 % pumps when the heat demand is fully developed. Initially however, we will recommend starting with two pumps. The production pumps are assumed to have the same capacity as the consumption pumps (lower lifting height but higher flow to fast charge the heat storage tank).

- Production pumps: (3 x 50 %) = 3 x (40/2). Necessary hydraulic capacity per pump is approx. 80 kW and electric supply per pump is approx. 100 kW
- Consumption pumps: Necessary hydraulic capacity per pump is approx. 80 kW and supplied electricity supply is approx. 100 kW.

Estimates are performed at a deltaT of 30 °C.

5.2.2 Peaking and backup plant in Docklands North

There are boilers located at Spencer Dock with a total capacity of approx. 7 MW. However, the boilers are privately owned. As mentioned above, the need for this boiler plant will be dependent on the risks of the supply through the existing tunnel under the Liffey being out of operation.

If the existing plant at Spencer Dock should be retrofitted for a situation where no supply is coming through the Liffey Tunnel, it will be necessary to install more boiler capacity to supply area 3A. Furthermore, supply pumps should be located with this additional boiler capacity to supply the district heating network in area 3A in reverse. The available space is not known in detail but boilers with e.g. double capacity will only require very limited additional space. It might therefore be possible to change the boilers to larger ones.

The necessary peaking heat capacity for the area is 28 MW without diversity, and 20 MW inclusive of diversity.

One major pro with separate boilers to supply phase 3A is that if connection of the district heating system from the DWtE to the Liffey tunnel is delayed, it will still be possible to supply district heating to this area, secure customers and start to generate revenue from selling heat. However, in this situation compliance with the BER and Part L requirements for new builds would not be met by a DH network fuelled initially by natural gas. This should however be looked further into and what customers this would affect at time of connection. As an alternative, biodiesel could be used to fuel the boilers supplying the DH network, thus meeting the Part L requirements. Biodiesel is however expensive and in this situation, it will not be possible to keep the price below the price of natural gas. Thus, the DH operator could experience a short-term loss but a long-term benefit since consumers will be connected to district heating and will not find other suitable technologies. If it turns out there is not adequate space in the existing boiler rooms for retrofitting with larger boilers, it could turn out to be very expensive to establish a separate boiler station in the area.

A peaking / backup plant in the North Docklands will be unmanned but the operational staff from the main peaking / backup plant will maintain the boilers and they will be operated from the main control room.

5.2.3 Discussion of potential boiler station at South Docklands

If e.g. there is a risk of unplanned outage of the system (e.g. due to a burst under the River Dodder crossing) we would recommend having a separate peaking and backup boiler facility for the South Docklands area. If this risk is found close to be unlikely and that the river crossing will likely always be in operation it could be considered to prepare the South Docklands system for an interim boiler station. A boiler station can be delivered as a container solution and is very easy to connect to a system.

In case separate boilers are found necessary for the area, the capacity of the boilers should be 2 x 12 MW heat capacity.

As with a separate boiler plant in North Docklands area, the risks of a potential delay in the connection of the South Docklands area would be reduced.

So far, no area has been identified in the South Docklands area for boilers.

A peaking / backup plant in South Docklands will be unmanned but the operational staff from the main peaking / backup plant will maintain the boilers and they will be started from the main control room.

6. ENVIRONMENTAL DESKTOP REVIEW

A high-level environmental assessment desktop review of the local environment in relation to the proposed DDHS (*i.e.* initial route corridors and potential location for DDHS infrastructure) was carried out by Nicholas O'Dwyer Ltd. (NOD) to identify at this early stage in the design process any potential impacts/high level constraints in relation to the proposed Scheme and the surrounding environment.

The desktop assessment consisted of a desktop review of the existing literature and web-based datasets in relation to the various environmental interests, including National Parks and Wildlife Service, National Biodiversity Data Centre, Irish Wetland Bird Survey data, Record of Monuments and Places and EPA soil map.

The overall objective of the desktop assessment was to identify key environmental issues and recommend studies/surveys where further assessments are deemed required as the detailed design progresses.

At this stage it is considered that the key environmental issues/potential for impacts relate to the following:

- Traffic/Human Beings/Material Assets/Utilities impacts during construction phase;
- Landscape & Visual Impact with particular reference to above ground structures (*i.e.* proposed Energy Station and the short section of the exit pipework from the DWtE Plant);
- Contaminated land during the construction phase;
- Ecology during the construction phase;
- Invasive Species during the construction phase;
- Cultural Heritage & Archaeology impacts during construction phase.

Surveys to confirm or otherwise the above environmental issues/constraints have been recommended to inform the design process.

Refer to **Appendix 4** for a copy of the High-Level Desktop Environmental Assessment Review.

7. SCREENING FOR APPROPRIATE ASSESSMENT

The Habitats Directive (Council Directive 92/43/EEC) requires that plans and projects must be screened for the likelihood of significant effects on Natura 2000 sites *i.e*. Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). This process aims to establish whether a full Appropriate Assessment (AA), as required by Article 6 of the Directive, is required in any particular case.

An AA Screening Report has been prepared by Nicholas O'Dwyer Ltd. and NM Ecology Ltd. to determine the likely significant effects, if any, of the construction and operation of the proposed DDHS on the Natura 2000 network.

The AA Screening concluded that the construction and operational activities associated with the proposed DDHS developed thus far, individually or in combination with other plans or projects, will not have a significant effect on the Natura 2000 Network, with specific reference to the South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA and North Dublin Bay SAC. Accordingly, it was concluded that an Appropriate Assessment of the proposed DDHS is not required.

This report and its findings may need to be updated in support of the planning application or as the detailed design of the scheme progresses and route alignments are amended, or other impacts become obvious.

Refer to **Appendix 5** for a copy of the Appropriate Assessment Screening Report.

8. PLANNING ADVICE ON ROUTE

A high-level initial overview of the planning requirements for the scheme was undertaken by NOD. This overview outlines the requirement for and potential routes to obtaining planning permission along with the relevant national, regional and local planning policy.

The four main routes to obtaining planning permission which have been examined are as follows:

- An application made directly to An Bord Pleanála under the provisions of the Planning and Development (Strategic Infrastructure) Act 2006; or,
- An application made by Dublin City Council to itself under Part 8 of the Planning and Development Regulations 2001 As Amended;
- An application made to Dublin City Council by a separate (partially or wholly owned) district heating company under the Planning and Development Act 2000; or,
- An application made by the City Council to An Bord Pleanála under Part 10 of the Planning and Development Regulations As Amended.

The potential benefits of undertaking an EIA process for this type of development under Part 10 of the Planning and Development Regulations as Amended are outlined and while all of the options outlined above are possible it is recommended that this option is considered as the preferred planning option at this stage.

Refer to **Appendix 6** for the Initial Planning Overview.

9. CONCLUSIONS AND RECOMMENDATIONS

The objective of this report is to review, and update previous designs as required to a feasibility level of detail sufficient to;

i. Identify route selection options, including review of previous options and
ii. Specify the capacity of plant and equipment and pipe network for phased implementation.

The total demand for initial phases is estimated at 114,000 MWh requiring approx. 7.3km of new pipe trench. This represents less than half the available capacity of the DWtE plant. Based on hydraulic modelling and our experience, the network pipe dimensions originally estimated can be reduced to remove the need for DN600 and reduce the length of DN500 pipe required.

With retro fits and future potential connections, the demand for the DH network could increase to 175,000MWh in the Poolbeg and Docklands area, requiring a total of 14.5km of new pipe trench. Based on additional hydraulic modelling of this demand, there is sufficient capacity to supply this demand with the reduced network dimension and more.

A route has been devised to exit the DWtE plant and run to the North and South Docklands. Challenges exist with existing utilities, traffic disruption, special areas of conservation and disturbance locally due to the construction for the network. Additionally, and of significance to timeline and physical installation capability for the DH network is the potential for conflicts with planned infrastructure projects in the area. These issues are further discussed in the Business Model report and the Project Risk Management Plan but require active management to address and realise the network.

A concept for the DH stem design has been outlined including: the DWtE plant; peaking and back up boiler; thermal storage and pressure holding and pumps. Space is available within the DWtE plant for the production pumps whereas the consumption pumps are recommended to be located in the new peaking/backup plant with the heat storage tank.

The proposed route has been assessed from an environmental perspective and the following issues have been identified as having potential for environmental impact:

- Traffic/Human Beings/Material Assets/Utilities impacts during construction phase;
- Landscape & Visual Impact with particular reference to above ground structures (*i.e.* proposed Energy Station and the short section of the exit pipework from the DWtE Plant);
- Contaminated land during the construction phase;
- Ecology during the construction phase;
- Invasive Species during the construction phase;
- Cultural Heritage & Archaeology impacts during construction phase.

Surveys to confirm or otherwise the above environmental issues/constraints have been recommended to inform the design process.

An Appropriate Assessment Screening has been conducted and it was concluded that an Appropriate Assessment of the proposed DDHS is not required.

A high level initial overview of the planning requirements has been conducted. The three main routes to obtaining planning permission which have been examined are as follows:

- An application made directly to An Bord Pleanála under the provisions of the Planning and Development (Strategic Infrastructure) Act 2006; or,

- An application made by Dublin City Council to itself under Part 8 of the Planning and Development Regulations 2001 As Amended;
- An application made to Dublin City Council by a separate (partially or wholly owned) district heating company under the Planning and Development Act 2000; or,
- An application made by Dublin City Council to An Bord Pleanála under Part 10 of the Planning and Development Regulations As Amended.

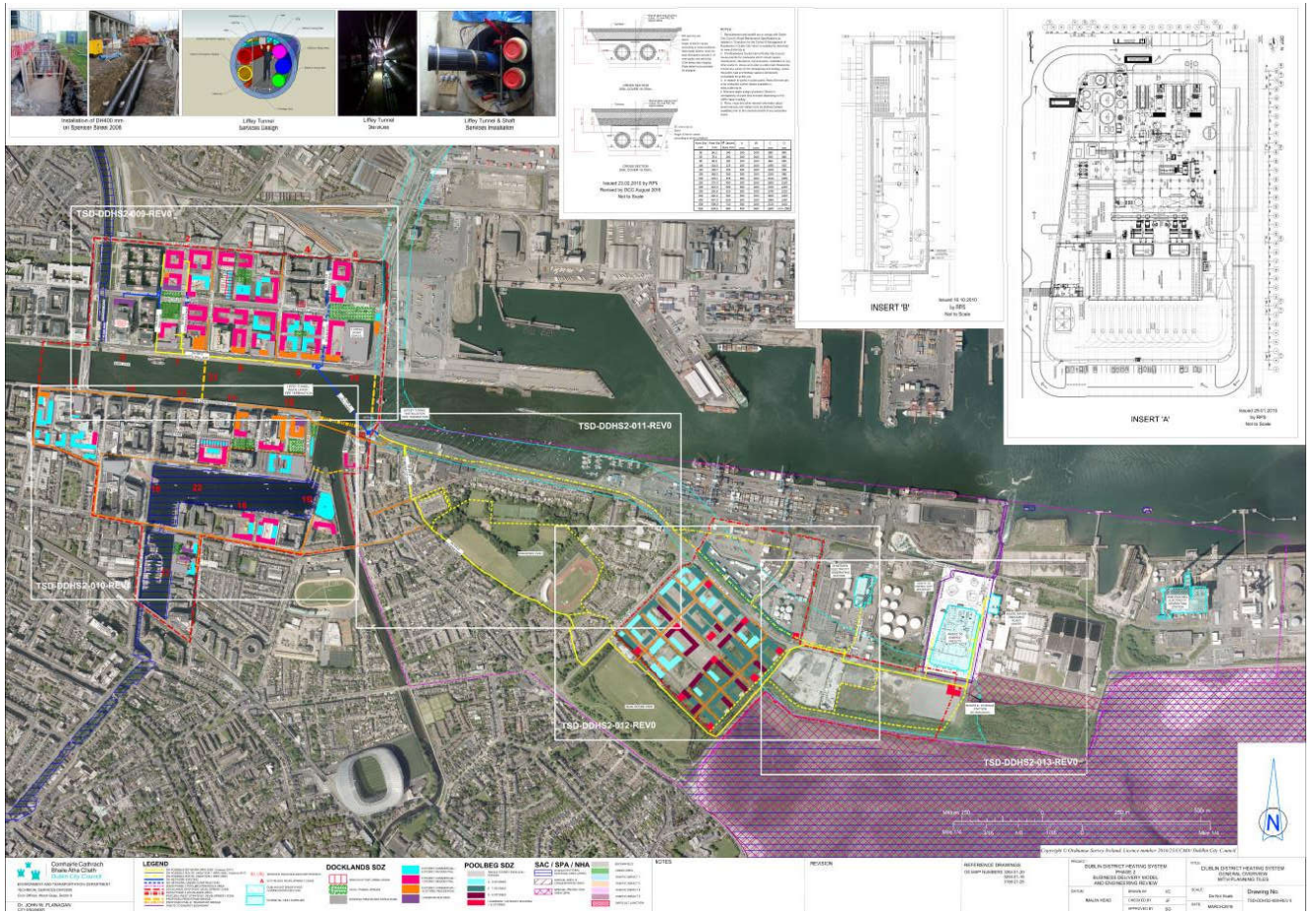
The potential benefits of undertaking an Environment Impact Assessment (EIA) process for this type of development under Part 10 of the Planning and Development Regulations As Amended are outlined and while all of the options outlined above are possible it is recommended that this option is considered as the preferred planning option at this stage.

APPENDIX 1
HYDRAULIC ANALYSIS

DUBLIN DISTRICT HEATING SYSTEM:
BUSINESS DELIVERY MODEL & ENGINEERING REVIEW

DUBLIN DISTRICT HEATING SYSTEM:
BUSINESS DELIVERY MODEL & ENGINEERING REVIEW

DUBLIN DISTRICT HEATING SYSTEM:
BUSINESS DELIVERY MODEL AND ENGINEERING REVIEW



RAMBØLL

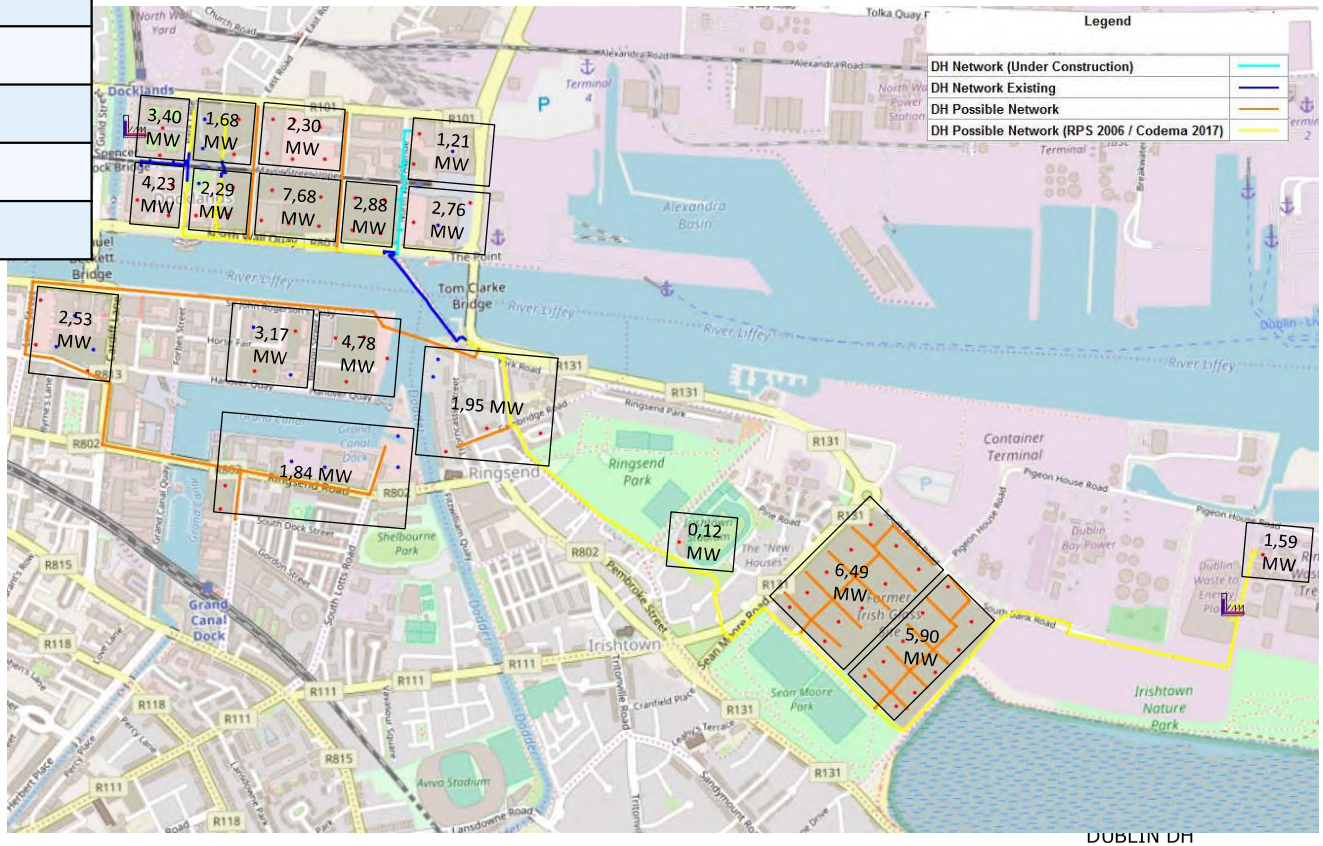
DISTRICT HEATING NETWORK

RAMBØLL

HEAT DEMAND

Phase	Heat demand (MWh)	Heat Demand (MW)*
Phase 1: PB SDZ	27.945	14,0
Phase 2: RGSD	4.134	2,1
Phase 3A: NL SDZ	56.872	28,4
Phase 3B: GCD SDZ	24.633	12,3
Total	113.584	56,8

* EFLH = 2.000 hrs



Heat loads without simultaneity

Estimated to be 0.7

RAMBØLL

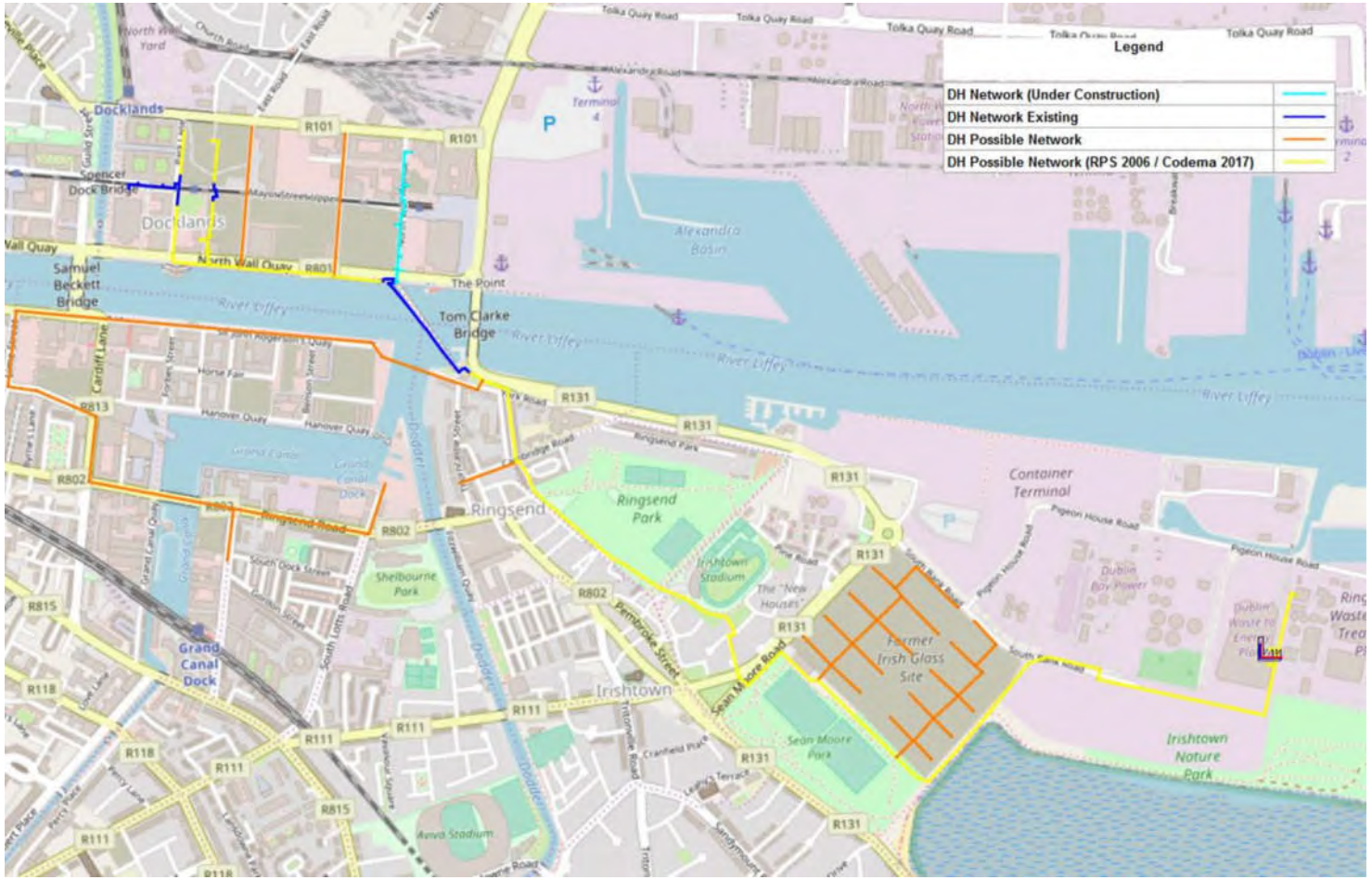
ASSUMPTIONS
PIPE CAPACITIES

Pipe Type	85/45 °C	100/45 °C	120/45 °C
	kW	kW	kW
DN25	49	67	90
DN32	99	135	183
DN40	147	200	270
DN50	273	373	502
DN65	536	731	983
DN80	818	1.115	1.500
DN100	1.626	2.218	2.980
DN125	2.850	3.880	5.220
DN150	4.700	6.400	8.550
DN200	9.550	13.000	17.460
DN250	17.100	23.100	30.750
DN300	27.050	36.800	49.400
DN350	34.800	47.400	63.600
DN400	49.400	67.200	90.300
DN450	67.700	92.100	123.700
DN500	89.900	122.300	163.800
DN550	110.700	149.600	199.200
DN600	131.700	178.000	236.700

- Press. Grad: 120 Pa/m
- Velocities:

> DN40	1	m/s
DN50 < > DN150	1.5	m/s
DN200 < > DN250	2	m/s
DN300 < > DN350	2.5	m/s
DN400 <	3	m/s

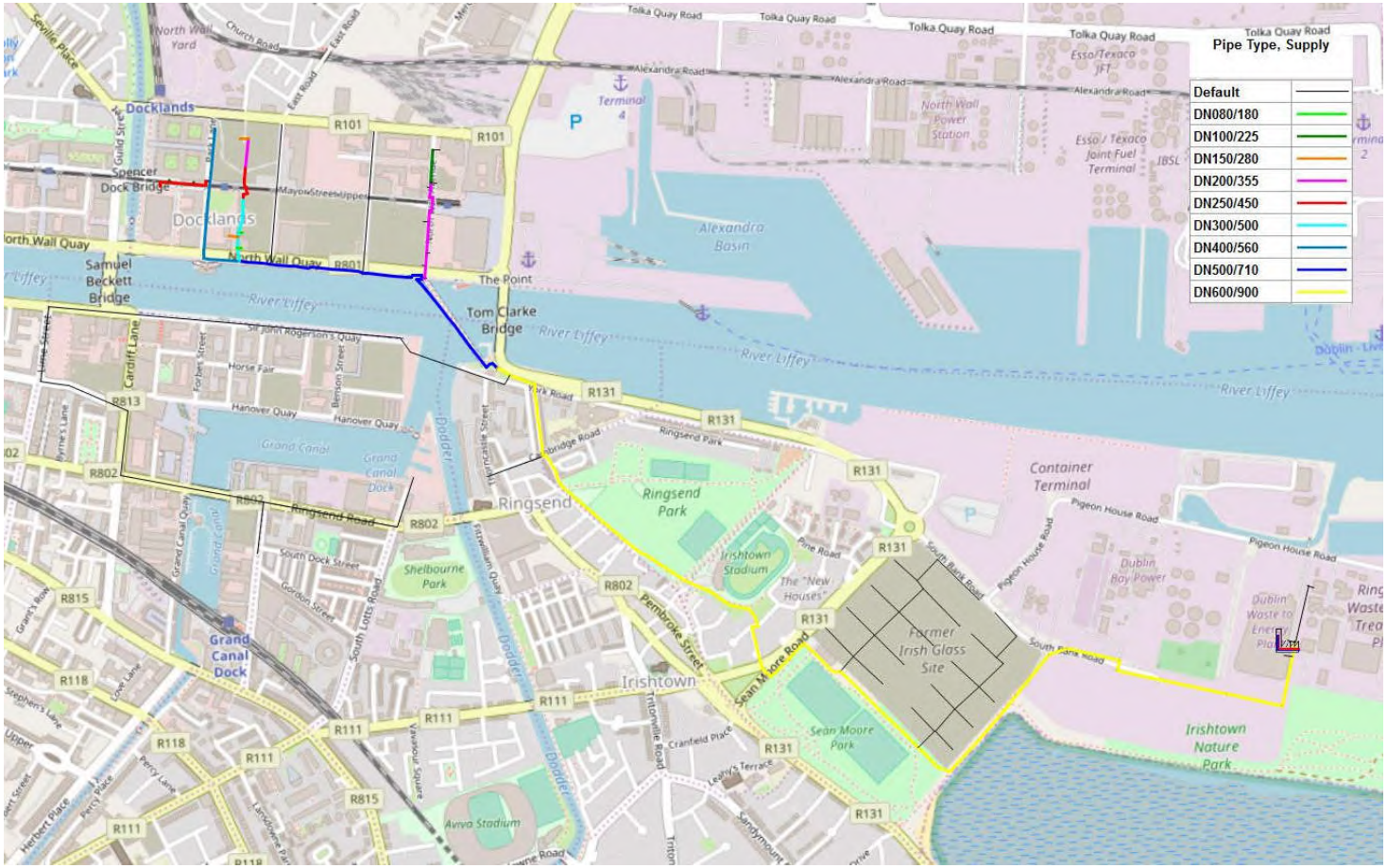
HYDRAULIC MODEL (TERMIS)



The model is based on info found in the files:

- TSD-DDHS2-008 to 013-REV0.pdf
- DG0723C01.pdf
- DG0724C05.pdf
- mde0128DG0000D01.pdf
- mde0128DG0020C01.pdf
- mde0128DG0031I01.pdf

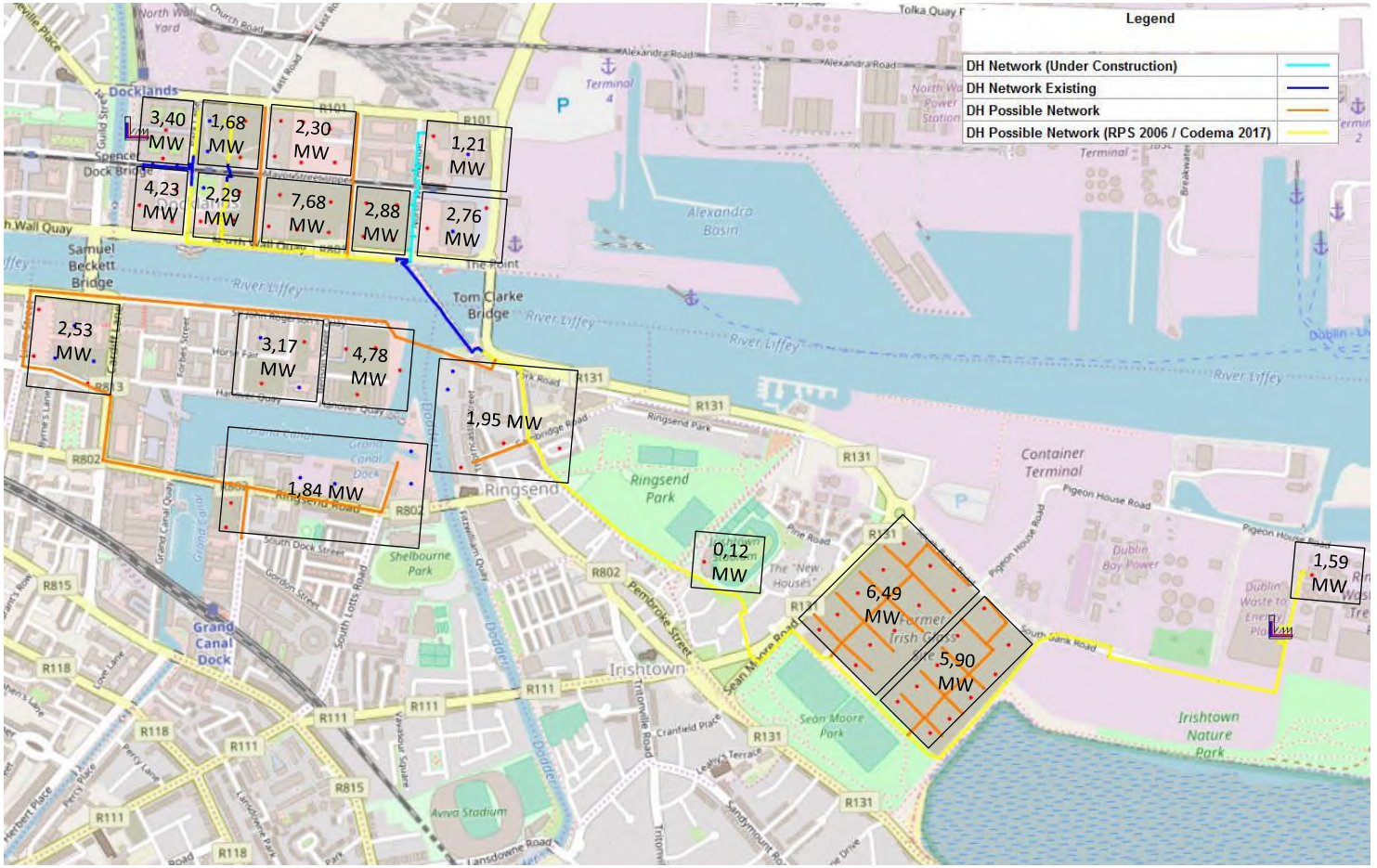
HYDRAULIC MODEL (TERMIS)



The model is based on info found in the files:

- TSD-DDHS2-008 to 013-REV0.pdf
- DG0723C01.pdf
- DG0724C05.pdf
- mde0128DG0000D01.pdf
- mde0128DG0020C01.pdf
- mde0128DG0031I01.pdf

HYDRAULIC MODEL (TERMIS)



Heat loads without simultaneity

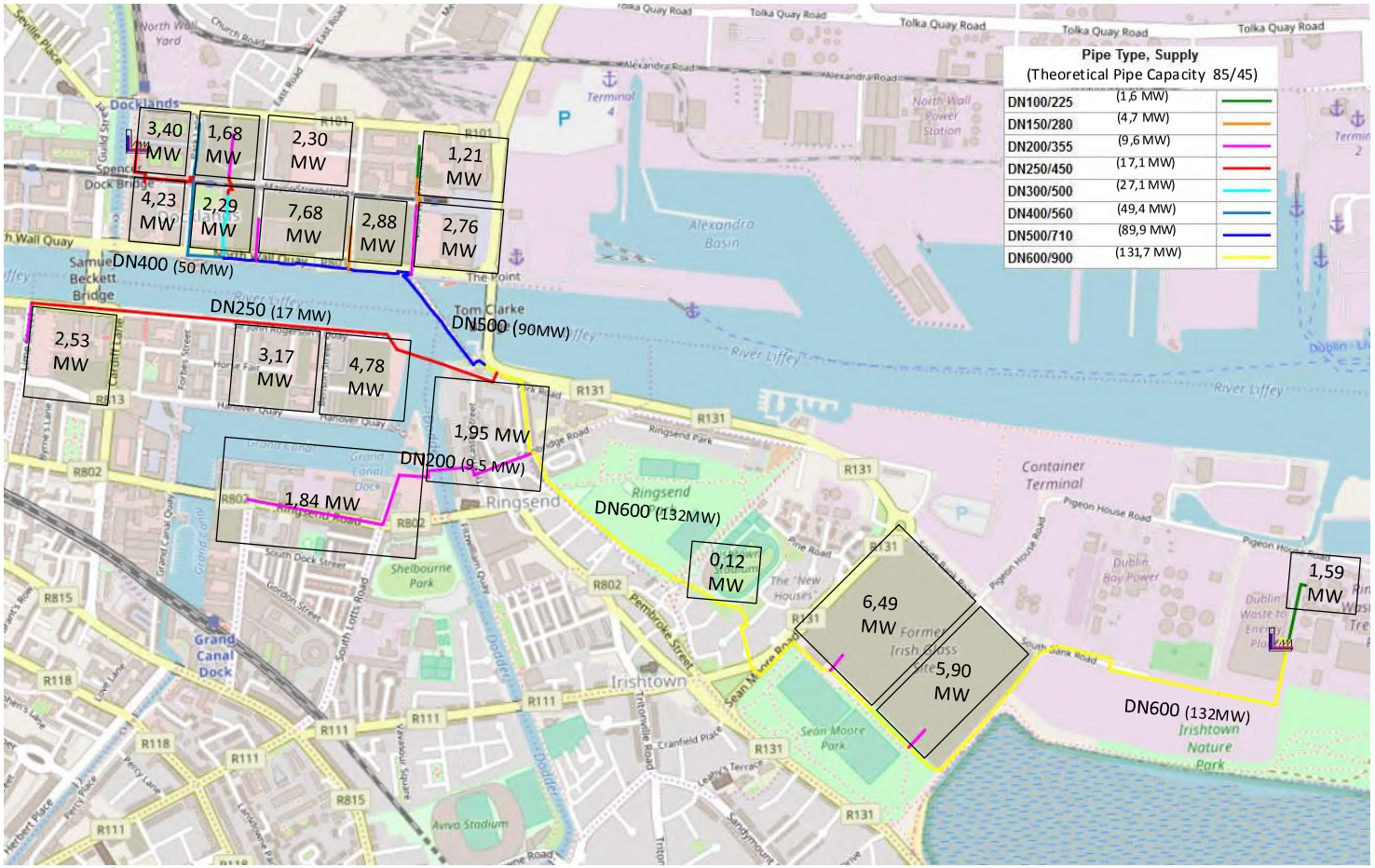
Estimated to be 0.7

HYDRAULIC MODELLING SCENARIOS

RAMBOLL

DUBLIN DH
XX

SCENARIO 1: AS PLANNED



Heat loads without simultaneity

Estimated to be 0.7

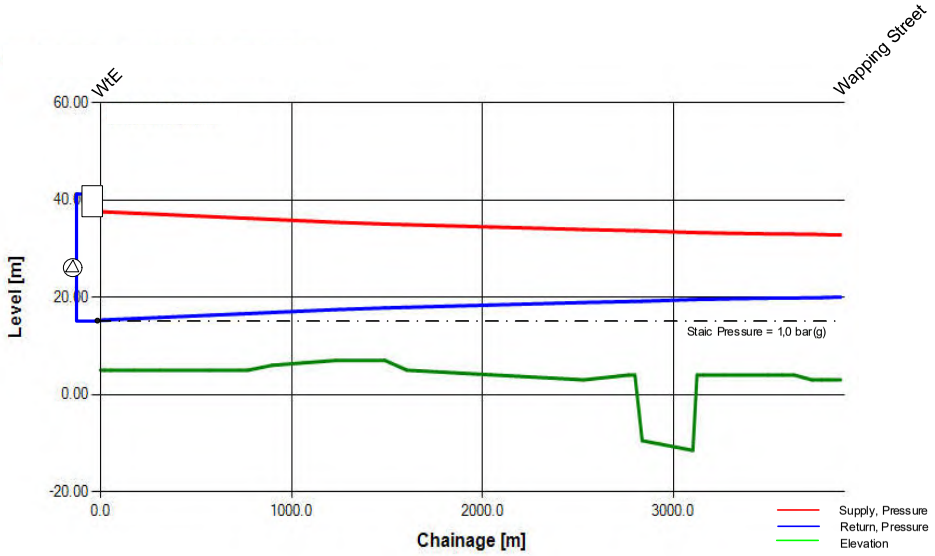
SCENARIO 1A: AS PLANNED
HEAT DEMAND ~ 56,8 MW (NO SIMULTANEITY)

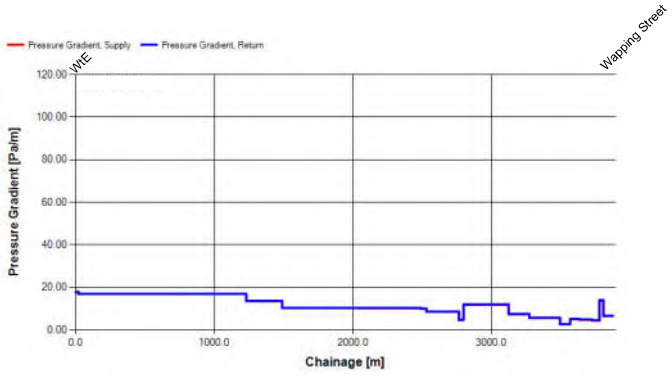
WtE:

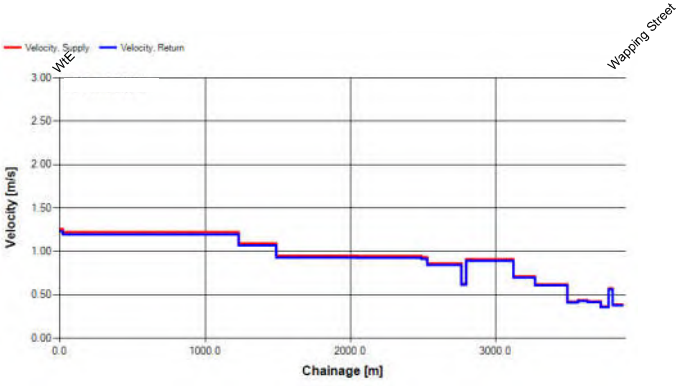
- Power (heat): 57,2 MW
- Flow: 1236 m^3/h
- Supply temp.: 85 °C
- Return temp.: 45 °C
- Pump head: 3,6 bar
  (1,5 bar internal loss in boiler)

Network:

- Max. press.: 4,3 bar(g)
- Min. press.: 1,0 bar(g)
- Min. ΔP: 1,0 bar
- Max. velocity: 1,2 m/s
- Max. press. Gradient: 110 Pa/m



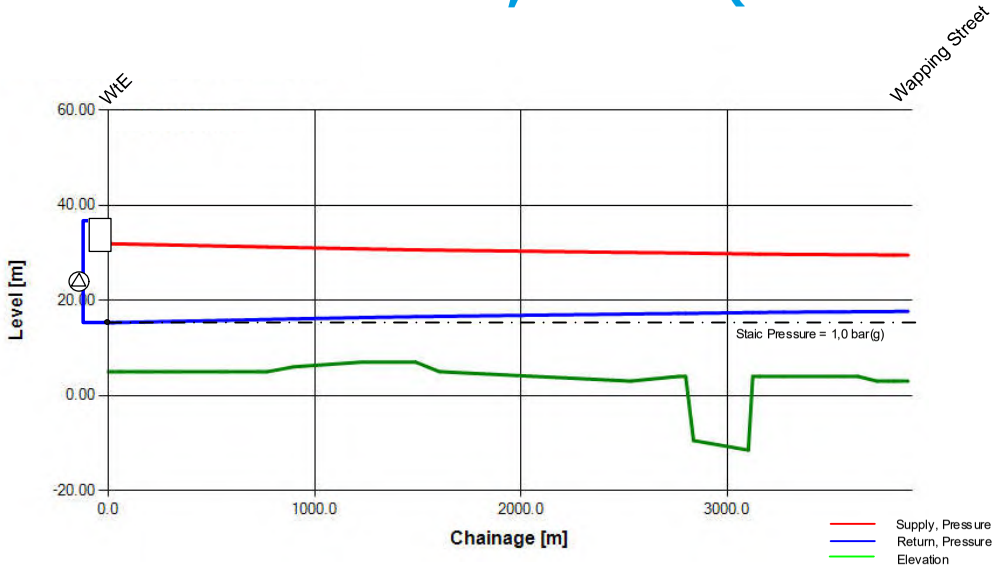




SCENARIO 1B: AS PLANNED
HEAT DEMAND ~ 39,8 MW (SIMULTANEITY: 0,7)

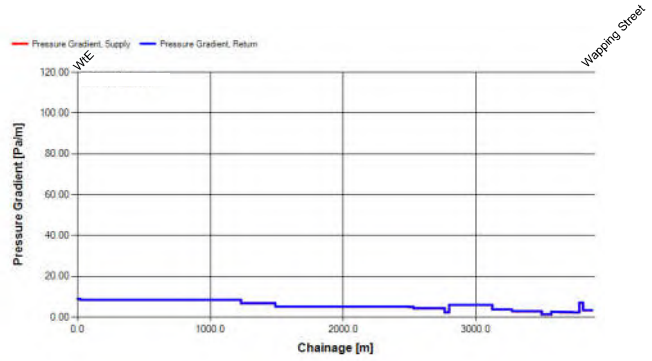
WtE:

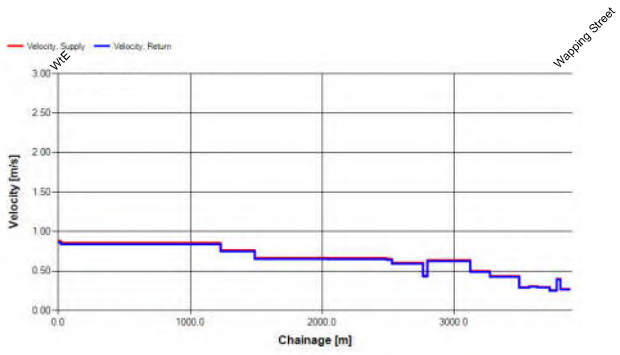
- Power (heat): 40,1 MW
- Flow: 867 m^3/h
- Supply temp.: 85 °C
- Return temp.: 45 °C
- Pump head: 3,1 bar
  (1,5 bar internal loss in boiler)



Network:

- Max. press.: 3,9 bar(g)
- Min. press.: 1,0 bar(g)
- Min. ΔP: 1,0 bar
- Max. velocity: 0,9 m/s
- Max. press. Gradient: 55 Pa/m





RAMBØLL

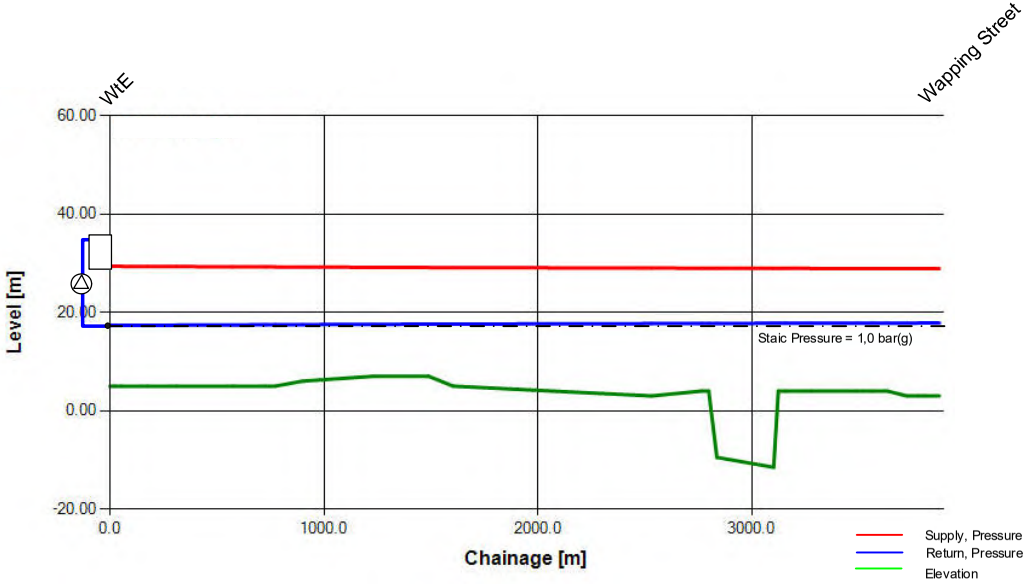
SCENARIO 1C: AS PLANNED
HEAT DEMAND ~ 17,0 MW (SIMULTANEITY: 0,3)

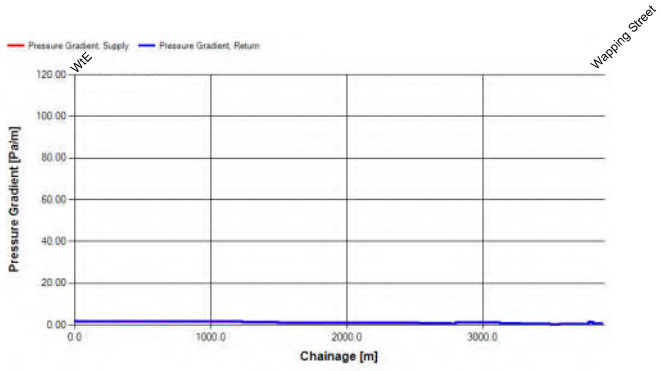
WtE:

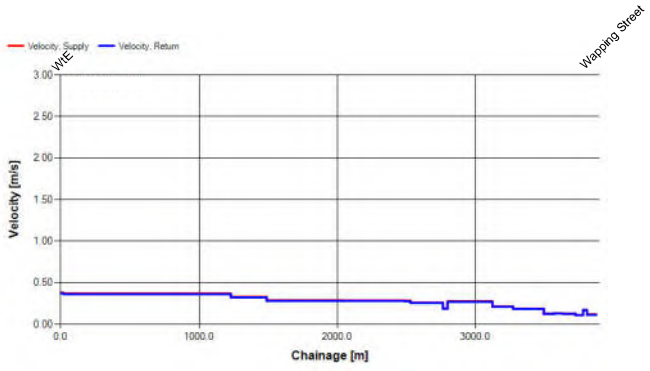
- Power (heat): 17,4 MW
- Flow: 375 m^3/h
- Supply temp.: 85 °C
- Return temp.: 45 °C
- Pump head: 2,6 bar
  (1,5 bar internal loss in boiler)

Network:

- Max. press.: 3,9 bar(g)
- Min. press.: 1,0 bar(g)
- Min. ΔP: 1,0 bar
- Max. velocity: 0,4 m/s
- Max. press. Gradient: 11 Pa/m

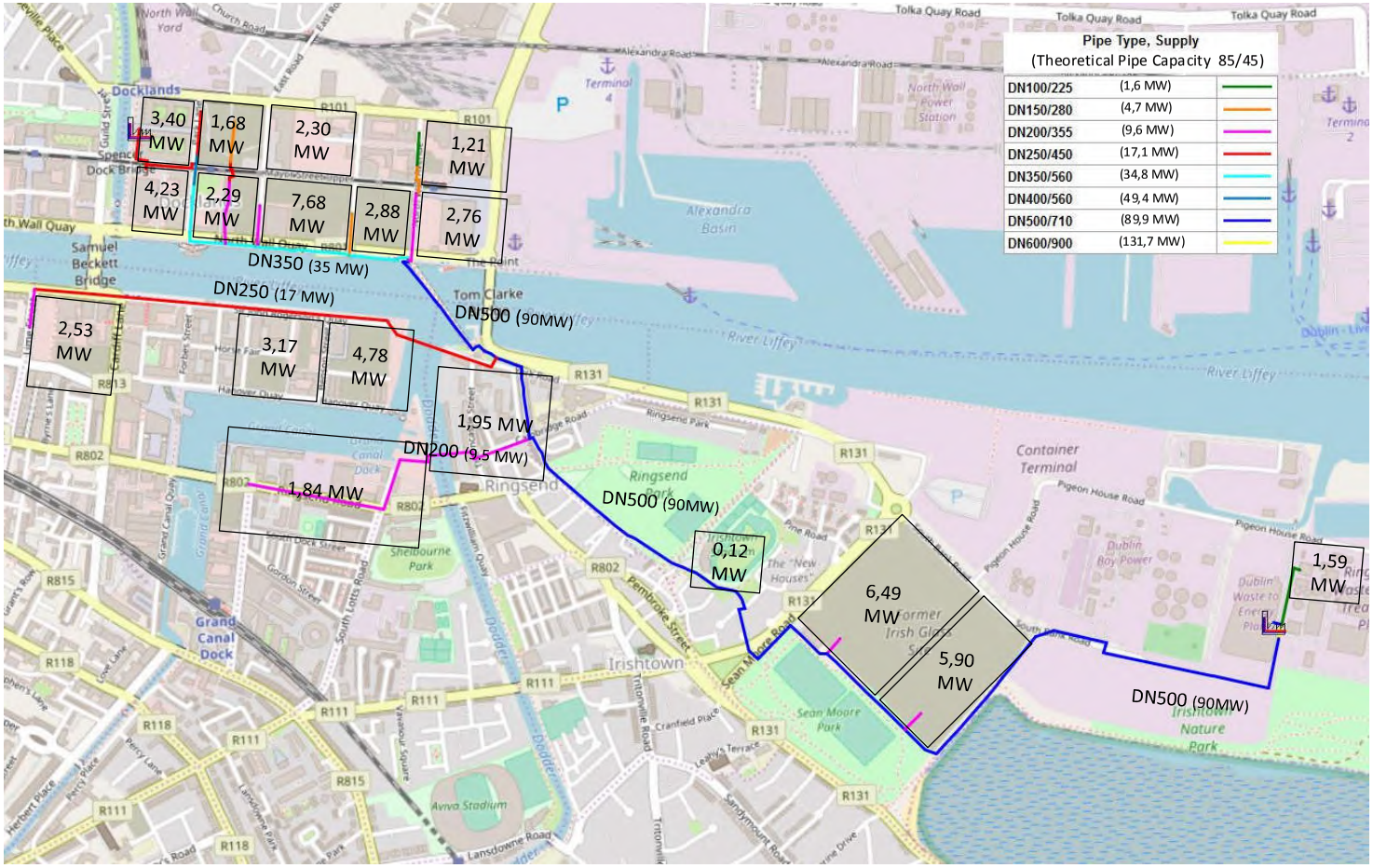






RAMBØLL

SCENARIO 2: WTE ~ 90 MW CAPACITY



Heat loads without simultaneity

Estimated to be 0.7

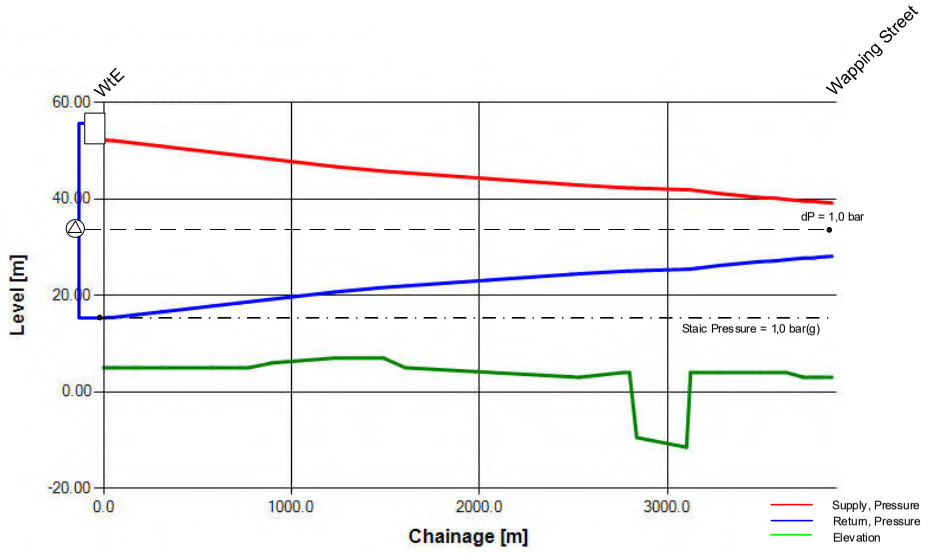
SCENARIO 2A: WTE ~ 90 MW CAPACITY
HEAT DEMAND ~ 56,8 MW (NO SIMULTANEITY)

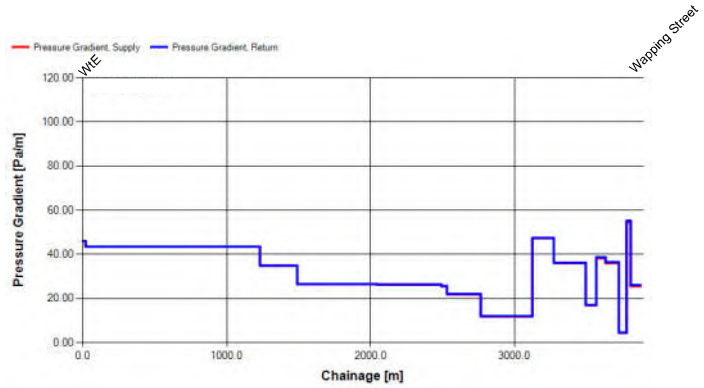
WtE:

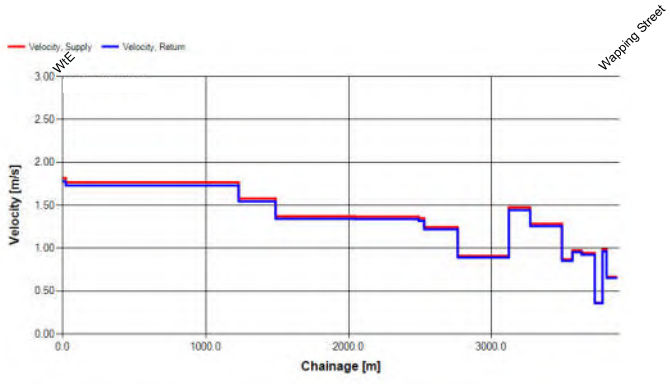
- Power (heat): 57,2 MW
- Flow: 1236 m^3/h
- Supply temp.: 85 °C
- Return temp.: 45 °C
- Pump head: 5,0 bar
  (1,5 bar internal loss in boiler)

Network:

- Max. press.: 5,1 bar(g)
- Min. press.: 1,0 bar(g)
- Min. ΔP: 1,0 bar
- Max. velocity: 1,8 m/s
- Max. press. Gradient: 110 Pa/m







RAMBØLL

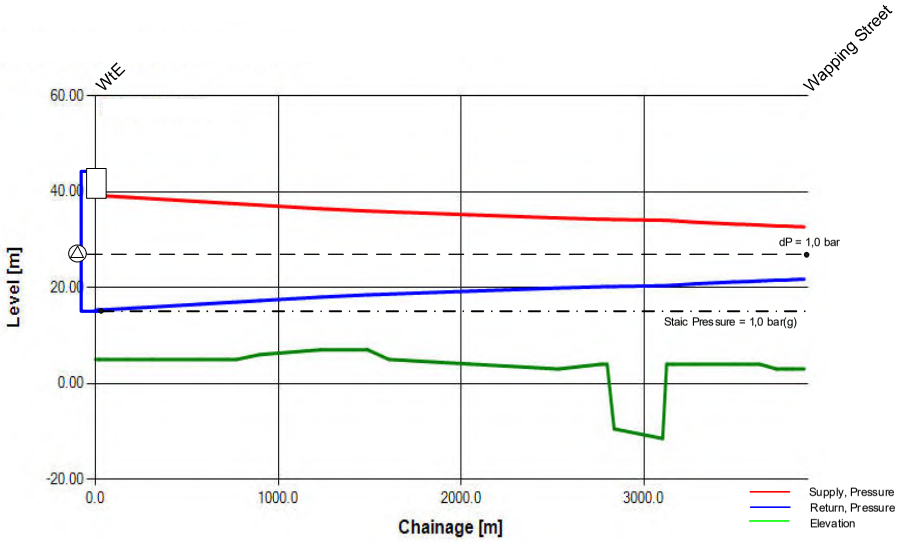
SCENARIO 2B: WTE ~ 90 MW CAPACITY
HEAT DEMAND ~ 39,8 MW (SIMULTANEITY: 0,7)

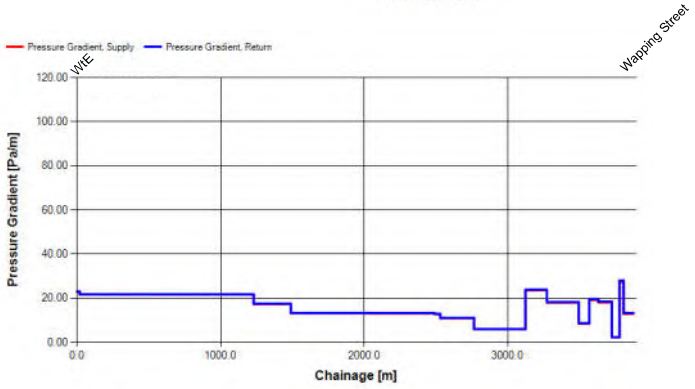
WtE:

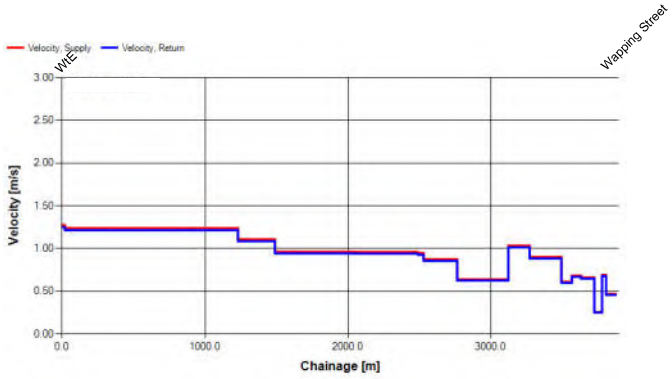
- Power (heat): 40,1 MW
- Flow: 867 m^3/h
- Supply temp.: 85 °C
- Return temp.: 45 °C
- Pump head: 3,8 bar
  (1,5 bar internal loss in boiler)

Network:

- Max. press.: 4,3 bar(g)
- Min. press.: 1,0 bar(g)
- Min. ΔP: 1,0 bar
- Max. velocity: 1,2 m/s
- Max. press. Gradient: 55 Pa/m







RAMBØLL

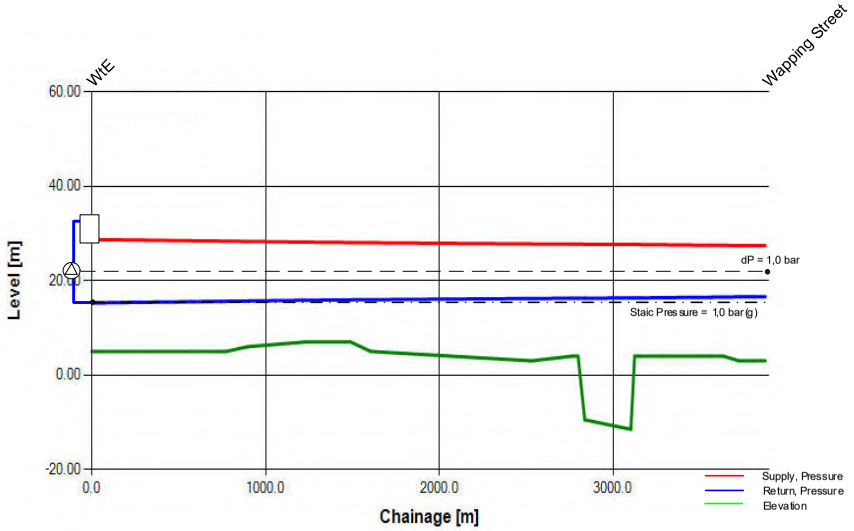
SCENARIO 2C: WTE ~ 90 MW CAPACITY
HEAT DEMAND ~ 17,0 MW (SIMULTANEITY: 0,3)

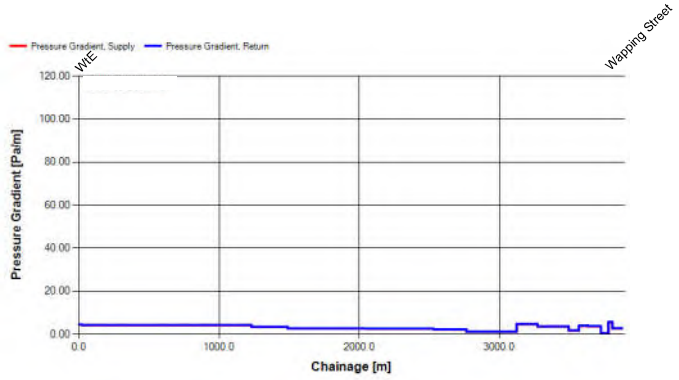
WtE:

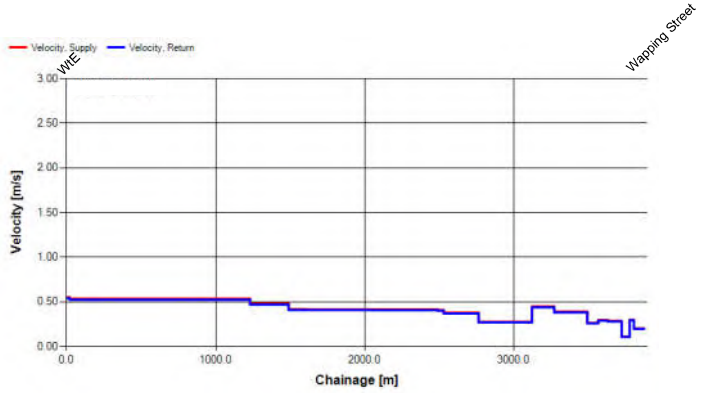
- Power (heat): 17,4 MW
- Flow: 375 m^3/h
- Supply temp.: 85 °C
- Return temp.: 45 °C
- Pump head: 2,8 bar
  (1,5 bar internal loss in boiler)

Network:

- Max. press.: 3,7 bar(g)
- Min. press.: 1,0 bar(g)
- Min. ΔP: 1,0 bar
- Max. velocity: 0,5 m/s
- Max. press. Gradient: 11 Pa/m

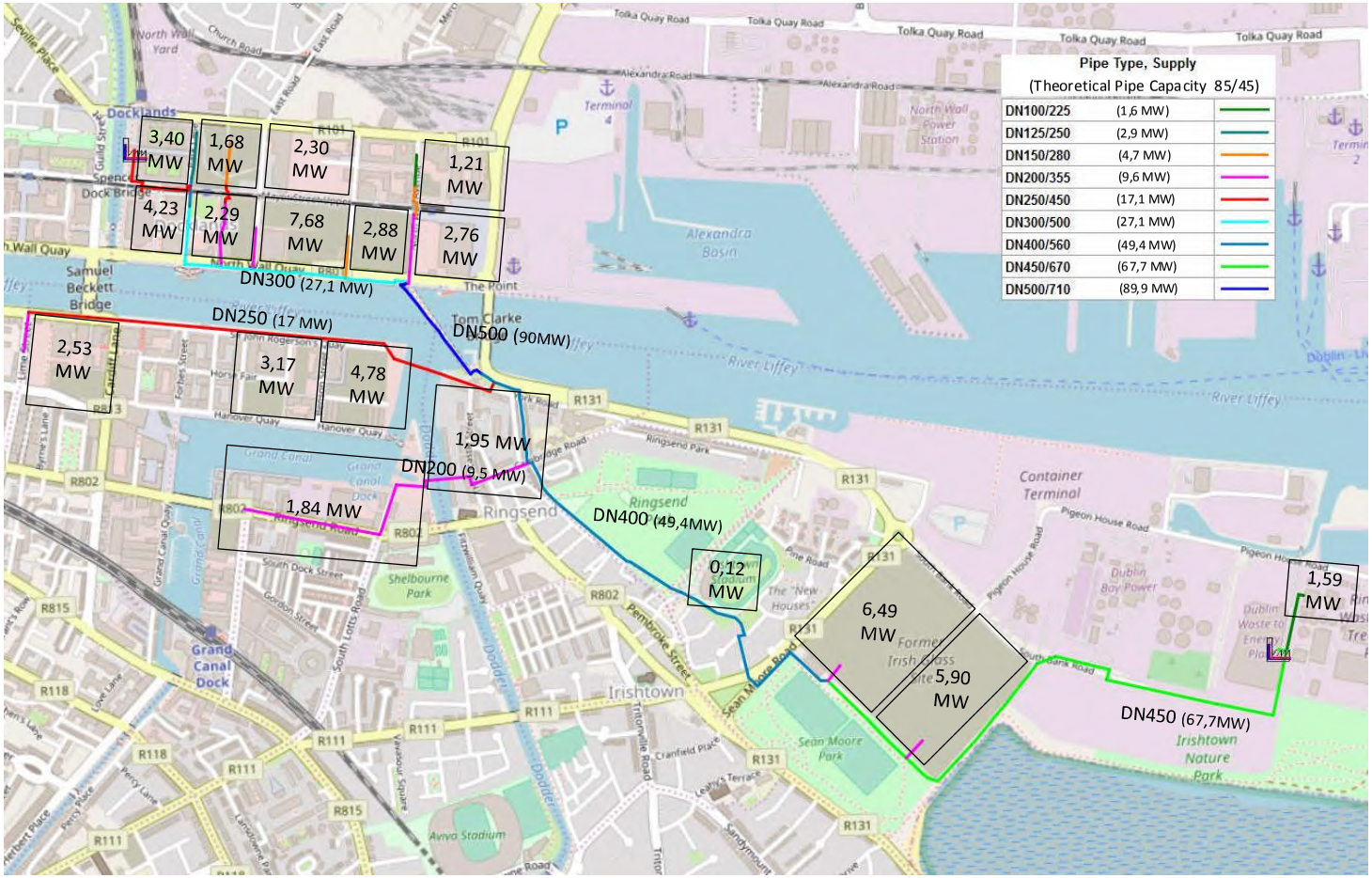






RAMBØLL

SCENARIO 3: HEAT DEMAND ~ 56,8 MW



Heat loads without simultaneity

Estimated to be 0.7

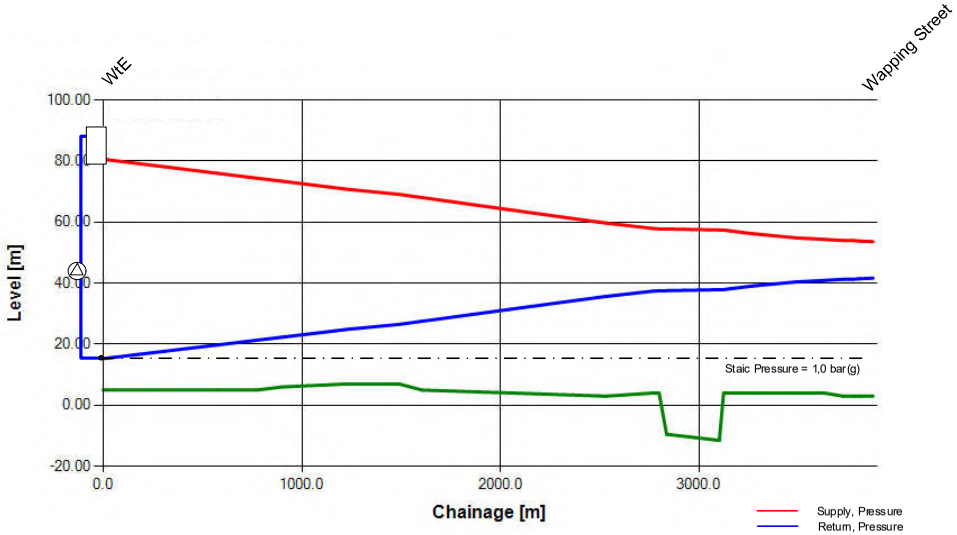
SCENARIO 3A: HEAT DEMAND ~ 56,8 MW CAPACITY
HEAT DEMAND ~ 56,8 MW (NO SIMULTANEITY)

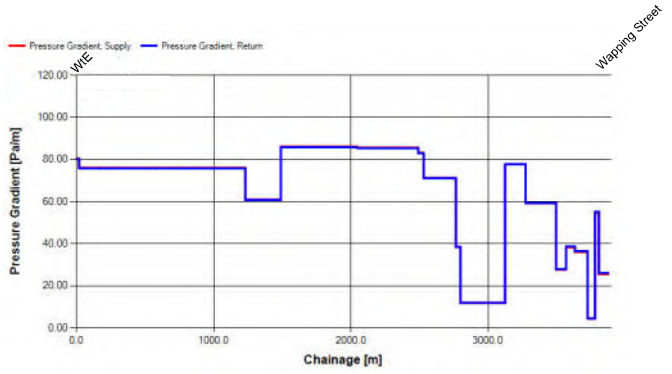
WtE:

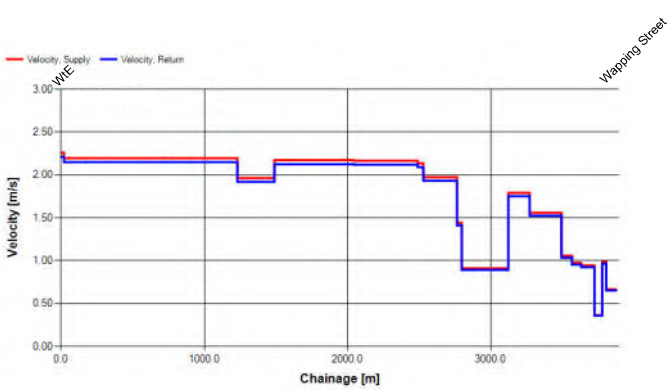
- Power (heat): 57,2 MW
- Flow: 1236 m^3/h
- Supply temp.: 85 °C
- Return temp.: 45 °C
- Pump head: 7,7 bar
  (1,5 bar internal loss in boiler)

Network:

- Max. press.: 7,2 bar(g)
- Min. press.: 1,0 bar(g)
- Min. ΔP: 1,0 bar
- Max. velocity: 2,3 m/s
- Max. press. Gradient: 110 Pa/m







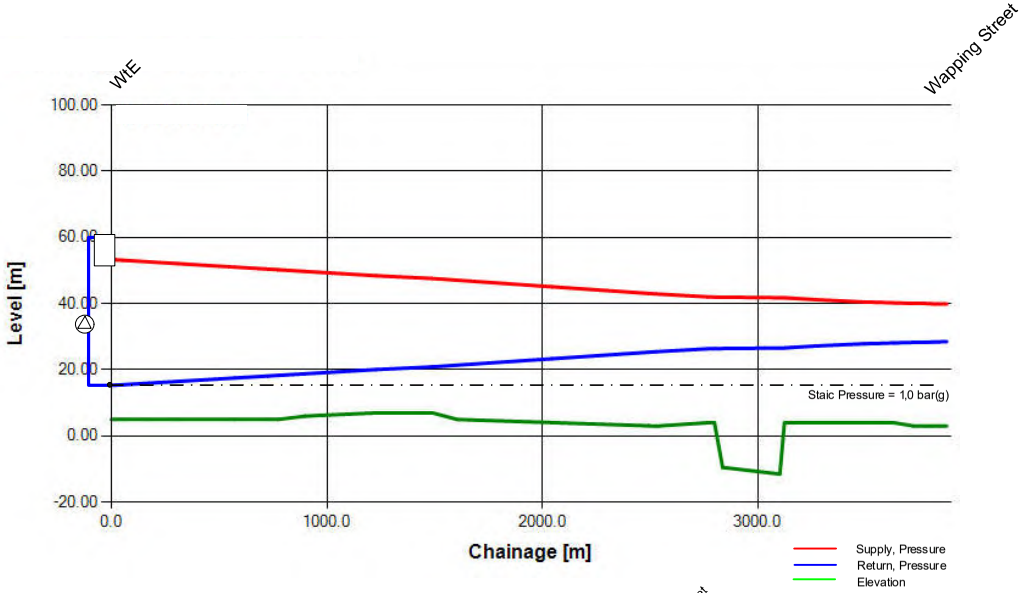
SCENARIO 3B: HEAT DEMAND ~ 56,7 MW
HEAT DEMAND ~ 39,8 MW (SIMULTANEITY: 0,7)

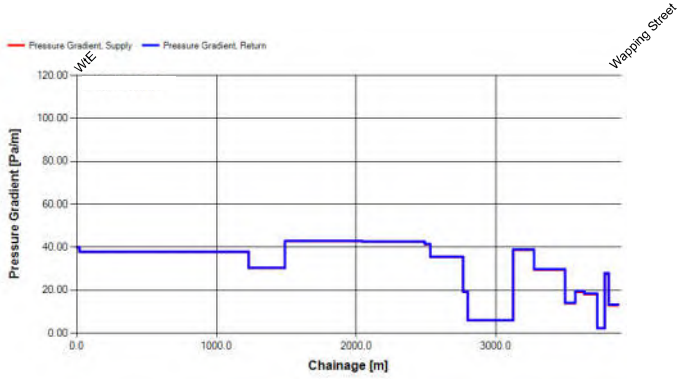
WtE:

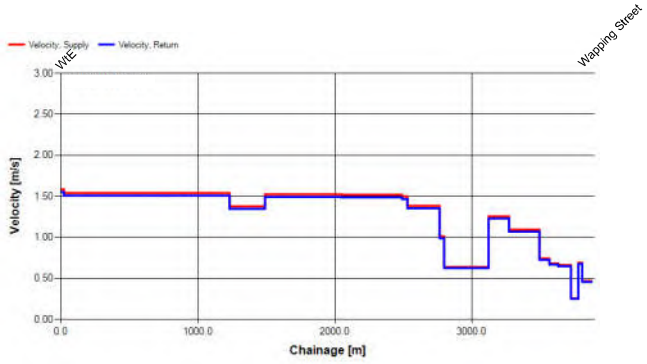
- Power (heat): 40,1 MW
- Flow: 867 m^3/h
- Supply temp.: 85 °C
- Return temp.: 45 °C
- Pump head: 5,1 bar
  (1,5 bar internal loss in boiler)

Network:

- Max. press.: 5,1 bar(g)
- Min. press.: 1,0 bar(g)
- Min. ΔP: 1,0 bar
- Max. velocity: 1,5 m/s
- Max. press. Gradient: 55 Pa/m







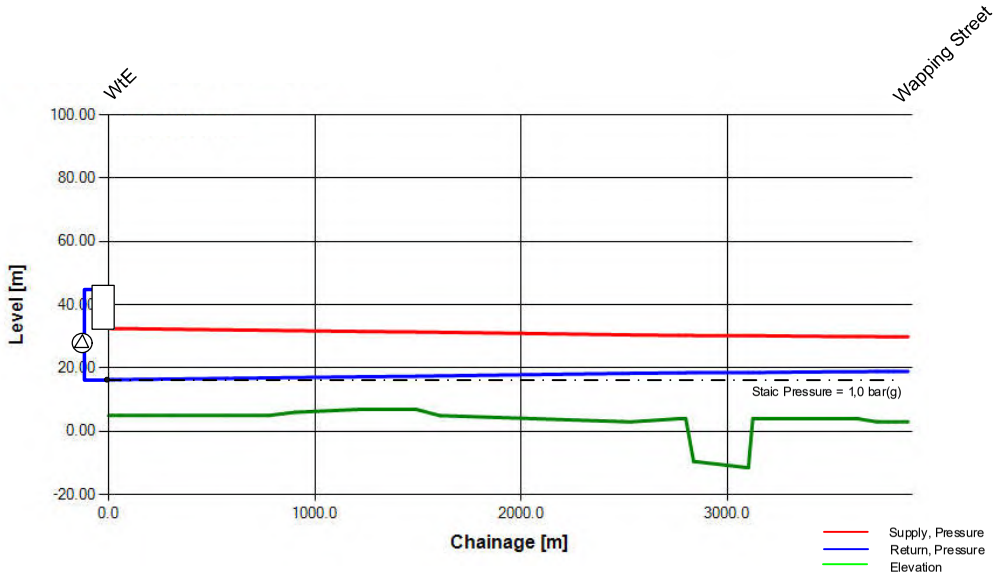
SCENARIO 3C: HEAT DEMAND ~ 56,8 MW
HEAT DEMAND ~ 17,0 MW (SIMULTANEITY: 0,3)

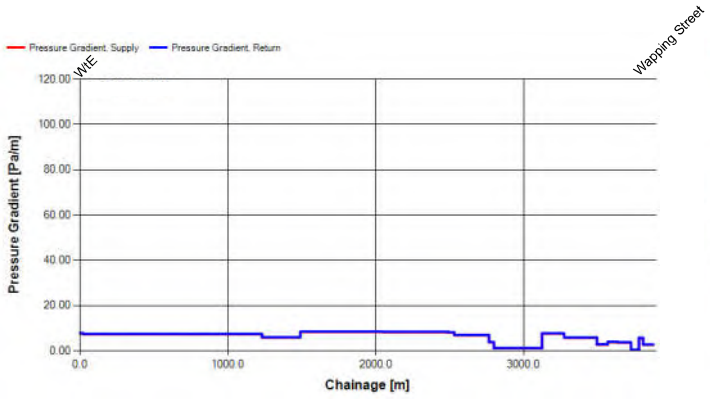
WtE:

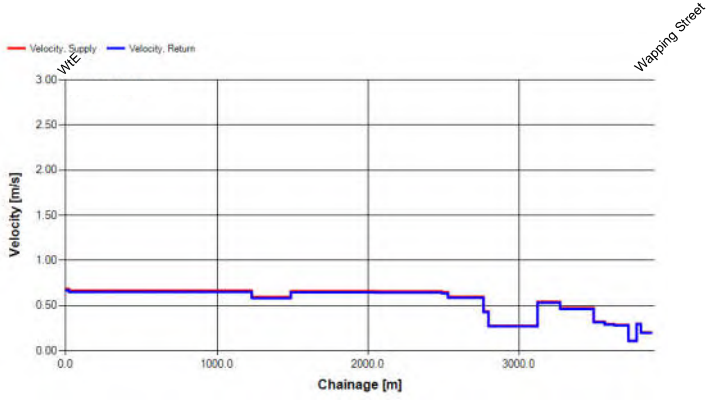
- Power (heat): 17,4 MW
- Flow: 375 m^3/h
- Supply temp.: 85 °C
- Return temp.: 45 °C
- Pump head: 3,0 bar
  (1,5 bar internal loss in boiler)

Network:

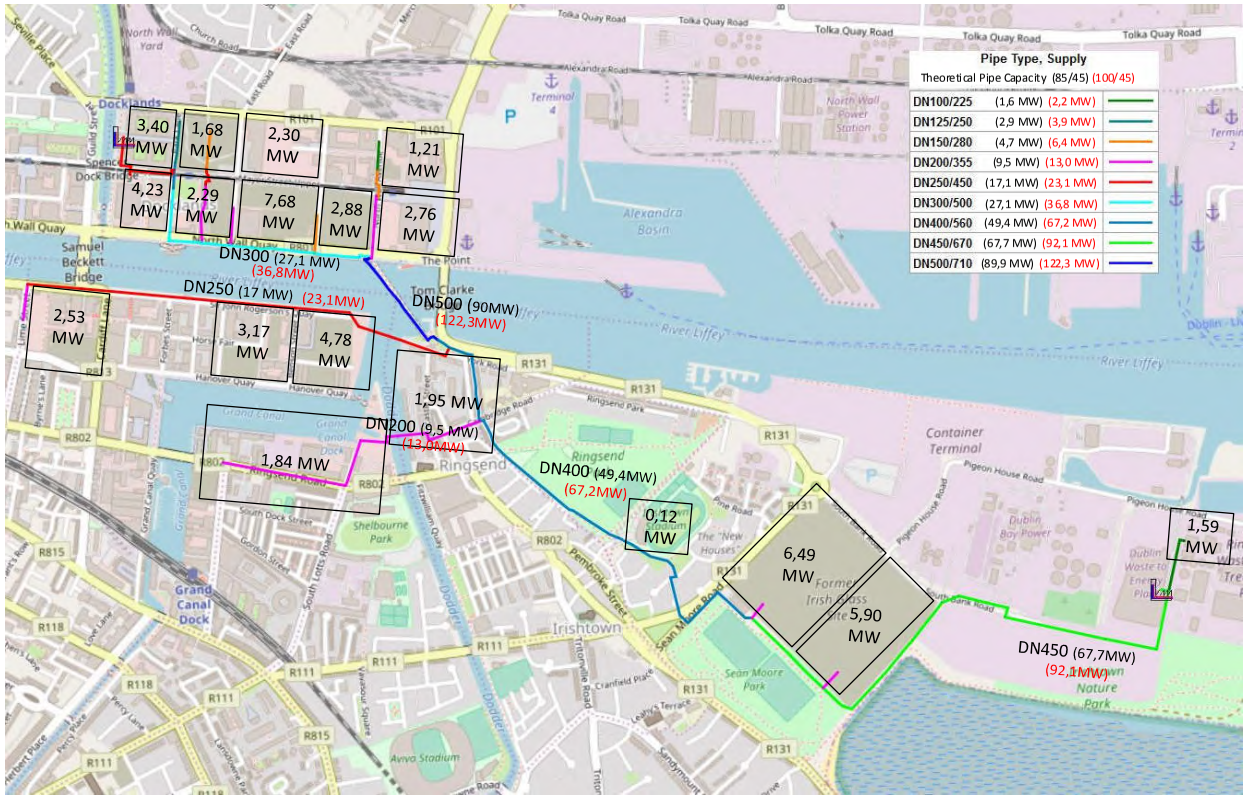
- Max. press.: 4,0 bar(g)
- Min. press.: 1,0 bar(g)
- Min. ΔP: 1,0 bar
- Max. velocity: 0,7 m/s
- Max. press. Gradient: 11 Pa/m







SUMMARY:



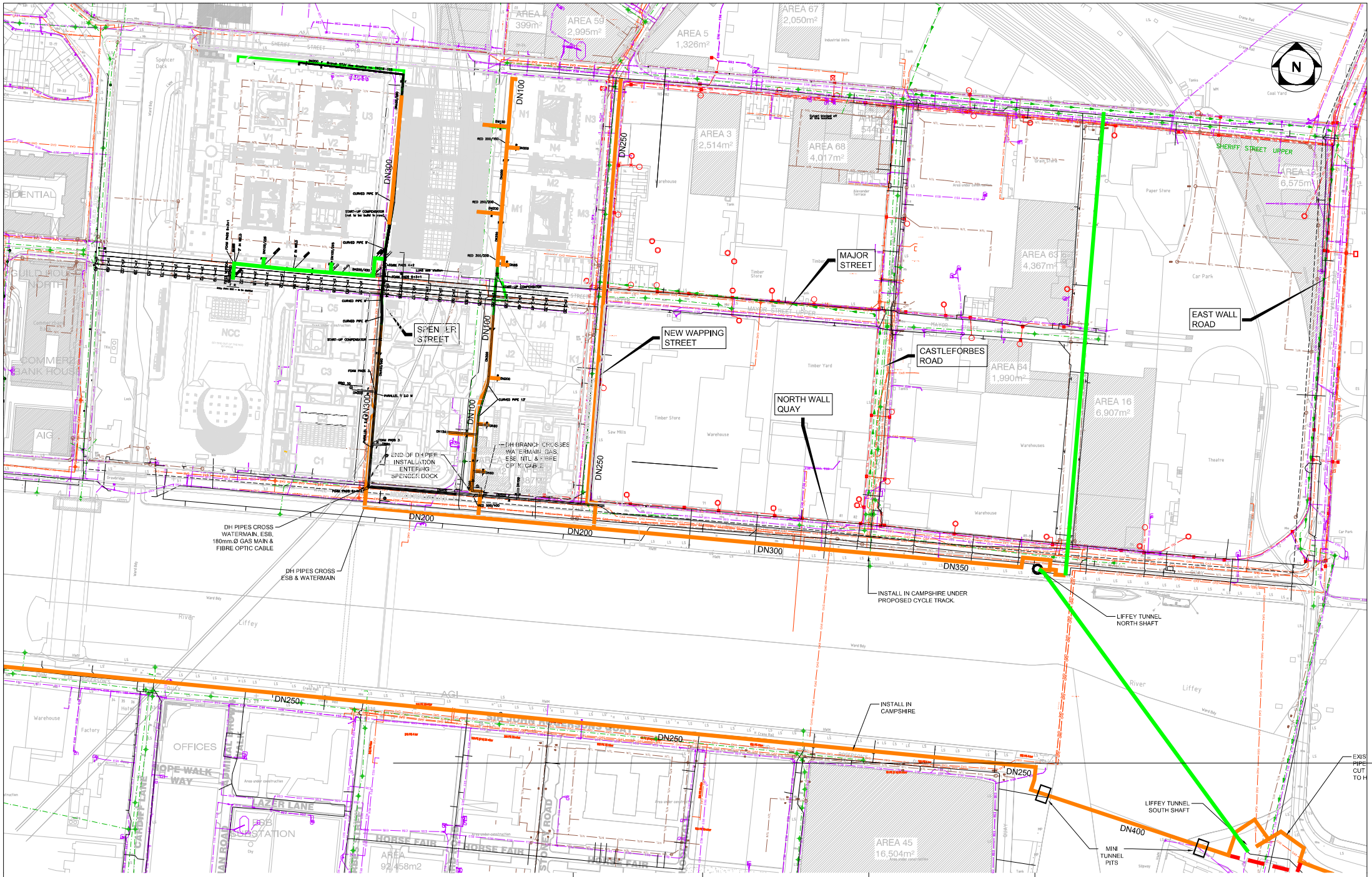
	Sc 1	Sc2	Sc3
	As Planned	WtE ~ 90 MW	Heat Demand ~ 56,7 MW
DN100/225	228	228	228
DN125/250	0	0	107
DN150/280	177	274	274
DN200/355	1350	1411	1411
DN250/450	1436	1542	1436
DN300/500	158	0	663
DN350/560	0	663	0
DN400/560	394	68	1377
DN450/670	0	0	1489
DN500/710	769	3123	325
DN600/900	2798	0	0
	7309	7309	7309

Heat loads without simultaneity

Estimated to be 0.7

Trench length in [m]

APPENDIX 2
NETWORK ROUTE DRAWINGS



LEGEND

- Existing Gas
- Existing ESB
- Existing Telecom
- Fibre Optic Cable
- Existing NTL
- Existing Watermains
- Existing Drainage
- Proposed 2 x 500mm.Ø Rising Main

DH Pipe Route Options

- Proposed route
- Alternate route
- Existing DH Pipe
- Poolbeg west SDZ boundary

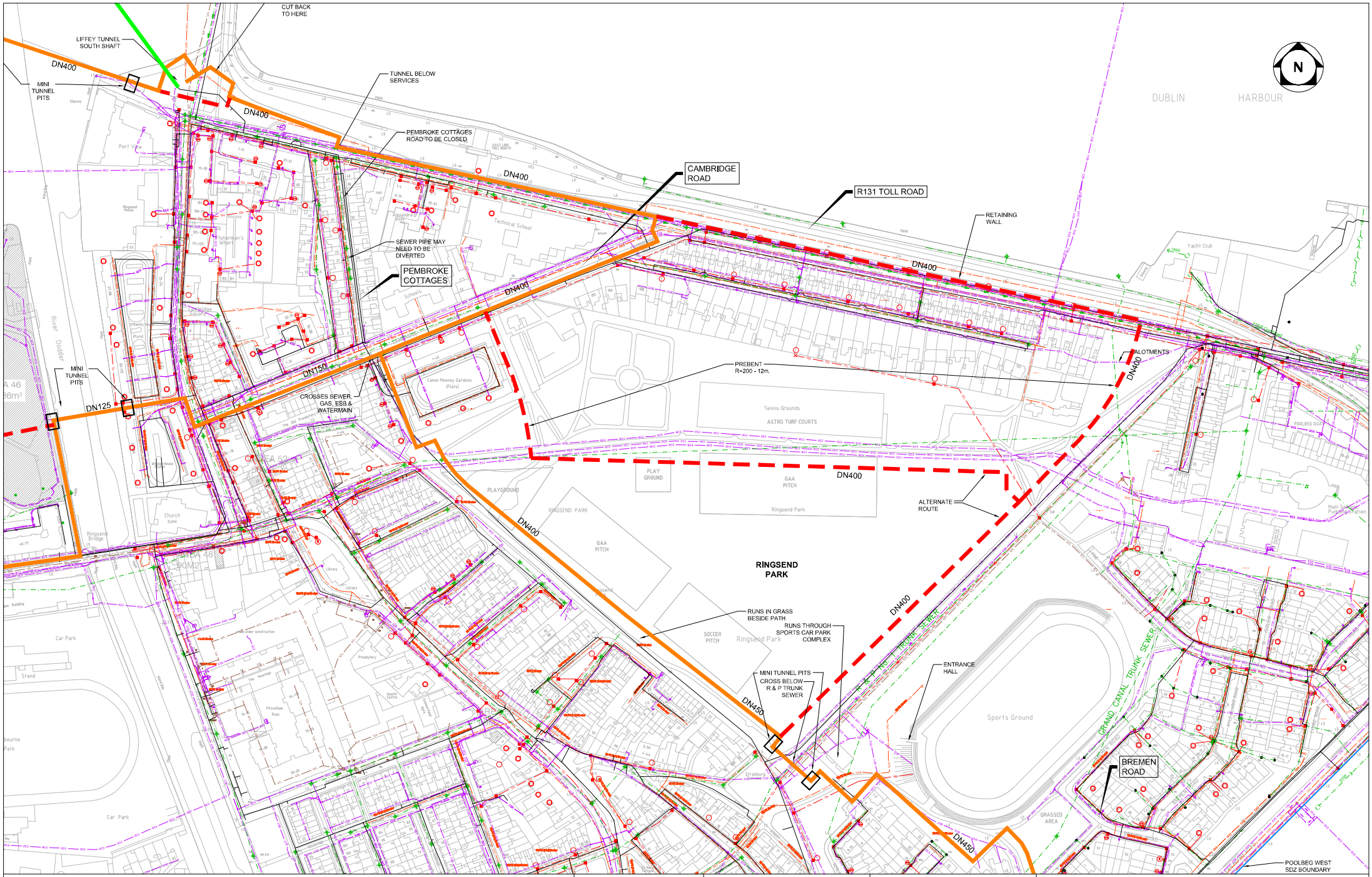
Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

DCD Business Delivery Model and Engineering Rev

New Route Proposal

Projektnr.	Dato	Rev. dato	Mål	Tegning nr.	side
1100033276	2018-05-22	2018-06-13	1 : 1,250 @ A1 NTS@A3	dwg 2	1 of 5

Hannemanns Allé 53
DK-2300 København S



LEGEND

- Existing Gas
- Existing ESB
- Existing Telecom
- Fibre Optic Cable
- Existing NTL
- Existing Watermains
- Existing Drainage
- Proposed 2 x 500mm.Ø Rising Main

DH Pipe Route Options

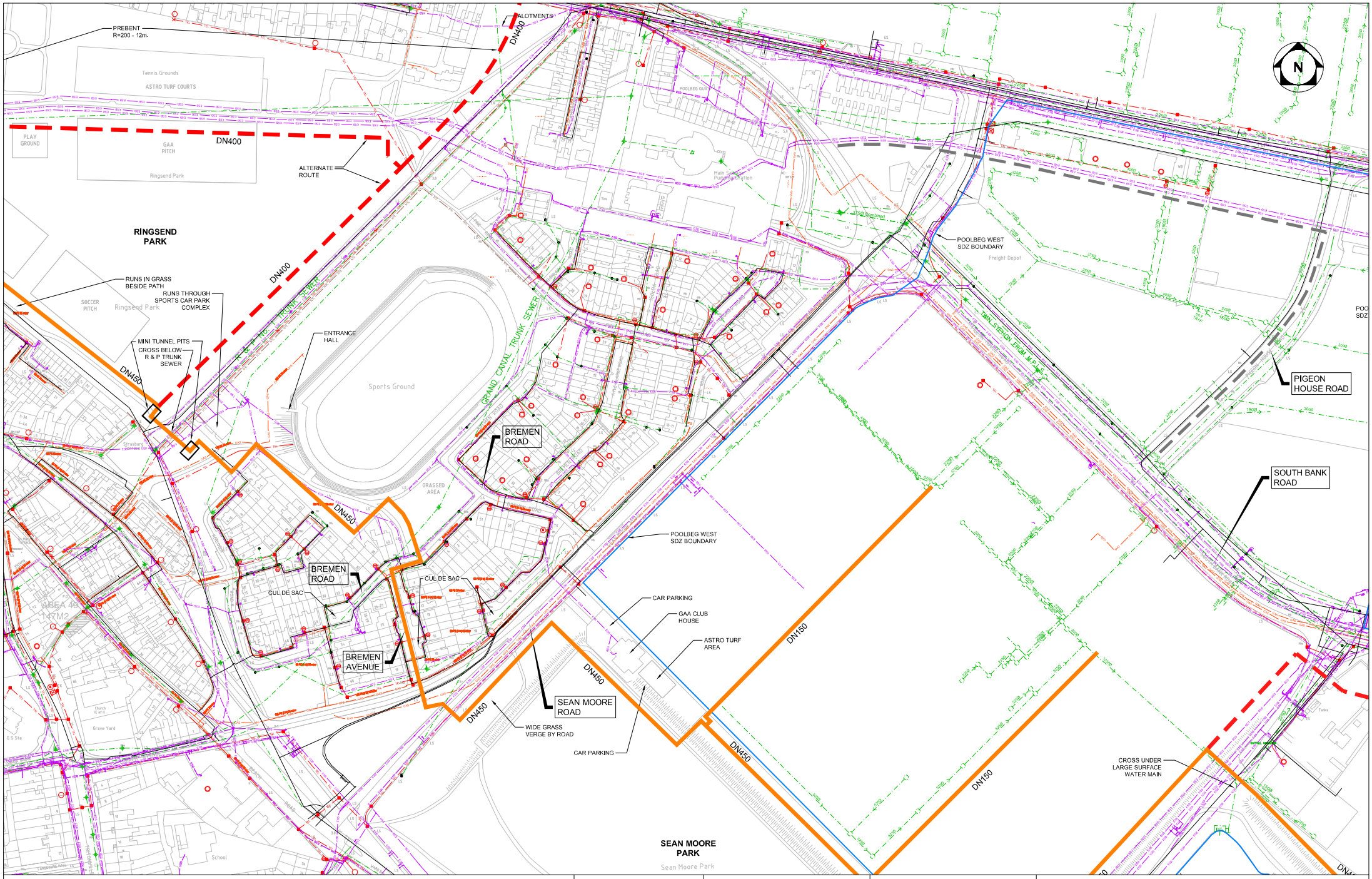
- Proposed route
- Alternate route
- Existing DH Pipe
- Poolbeg west SDZ boundary

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

DCD Business Delivery Model and Engineering Rev
New Route Proposal

LAMELL
Hannemanns Allé 53
DK-2300 København S

Projektnr.	Dato	Rev. dato	Mål	Tegning nr.	side
1100033276	2018-05-22	2018-06-13	1 : 1,250 @ A1 NTS@A3	dwg 2	2 of 5



LEGEND

- Existing Gas
- Existing ESB
- Existing Telecom
- Fibre Optic Cable
- Existing NTL
- Existing Watermains
- Existing Drainage
- Proposed 2 x 500mm.Ø Rising Main

DH Pipe Route Options

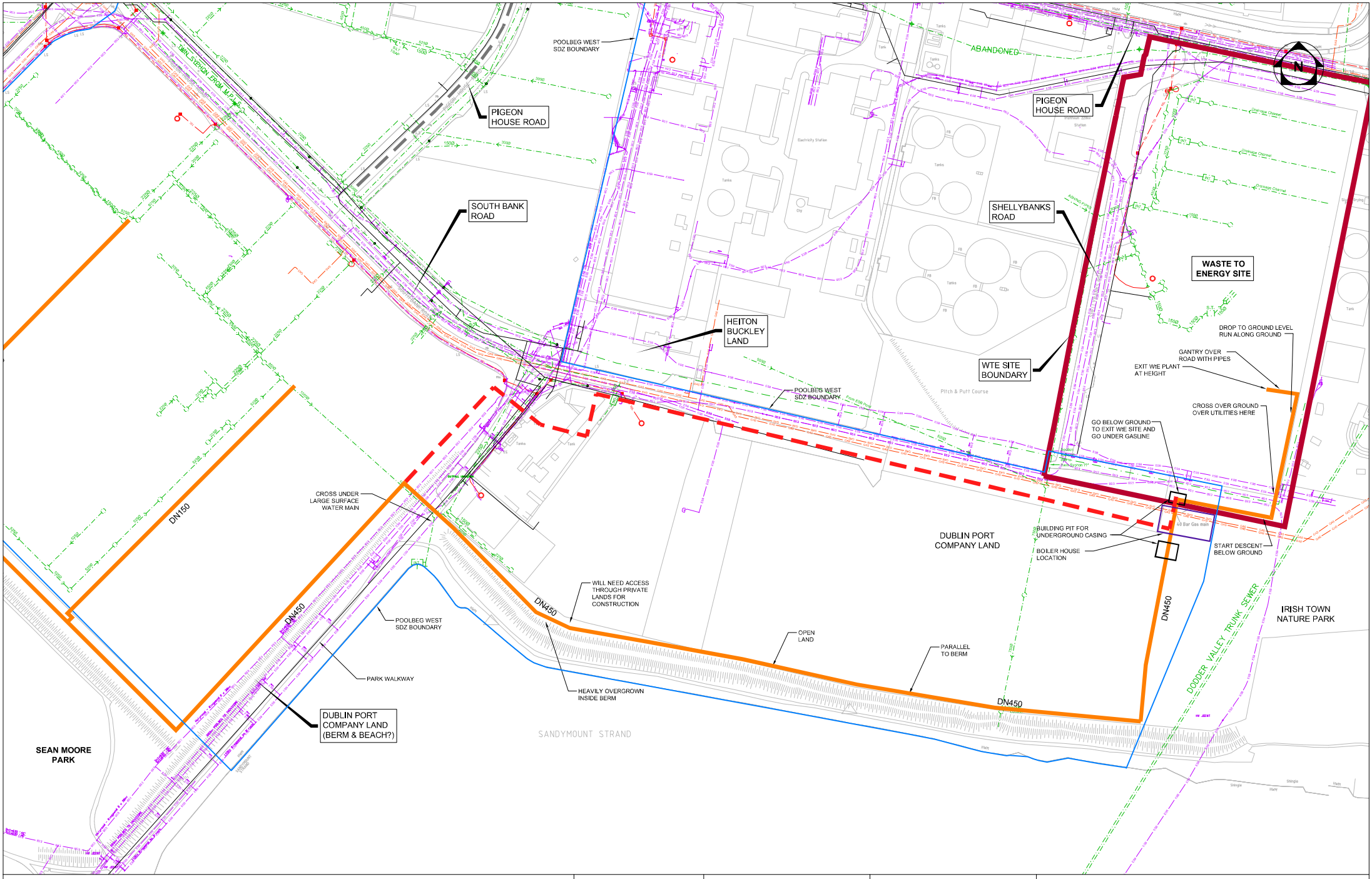
- Proposed route
- Alternate route
- Existing DH Pipe
- Poolbeg west SDZ boundary

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

DCD Business Delivery Model and Engineering Rev
New Route Proposal

LAM LL
Hannemanns Allé 53
DK-2300 København S

Projektnr.	Dato	Rev. dato	Mål	Tegning nr.	side
1100033276	2018-05-22	2018-06-13	1 : 1,250 @ A1 NTS@A3	dwg 2	3 of 5



LEGEND

- Existing Gas
- Existing ESB
- Existing Telecom
- Fibre Optic Cable
- Existing NTL
- Existing Watermains
- Existing Drainage
- Proposed 2 x 500mm.Ø Rising Main

DH Pipe Route Options

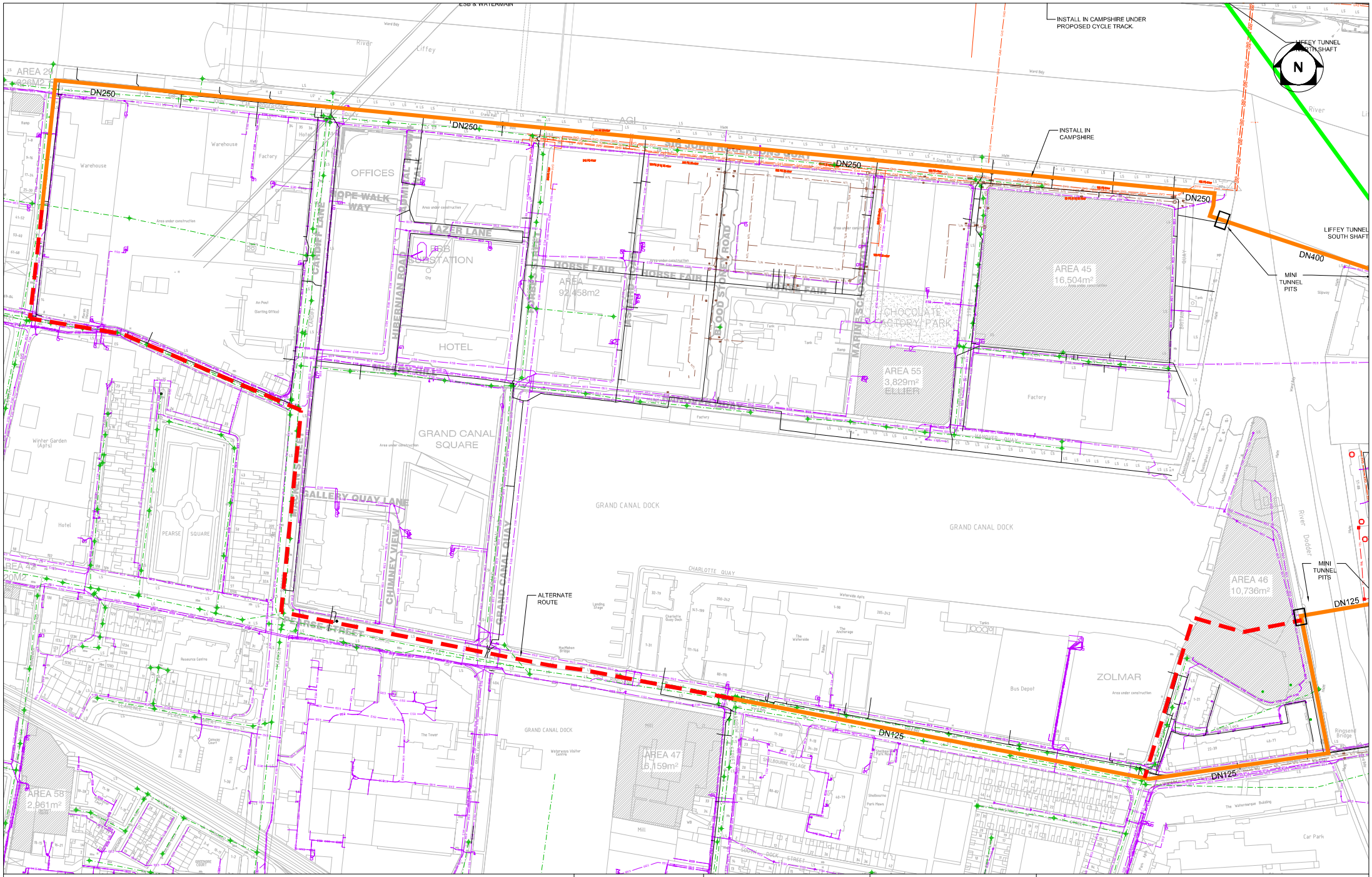
- Proposed route
- Alternate route
- Existing DH Pipe
- Poolbeg west SDZ boundary

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

DCD Business Delivery Model and Engineering Rev
New Route Proposal

LAMBELL
Hannemanns Allé 53
DK-2300 København S

Projektnr.	Dato	Rev. dato	Mål	Tegning nr.	side
1100033276	2018-05-22	2018-06-13	1 : 1,250 @ A1 NTS@A3	dwg 2	4 of 5



LEGEND

- Existing Gas
- Existing ESB
- Existing Telecom
- Fibre Optic Cable
- Existing NTL
- Existing Watermains
- Existing Drainage
- Proposed 2 x 500mm.Ø Rising Main

DH Pipe Route Options

- Proposed route
- Alternate route
- Existing DH Pipe
- Poolbeg west SDZ boundary

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

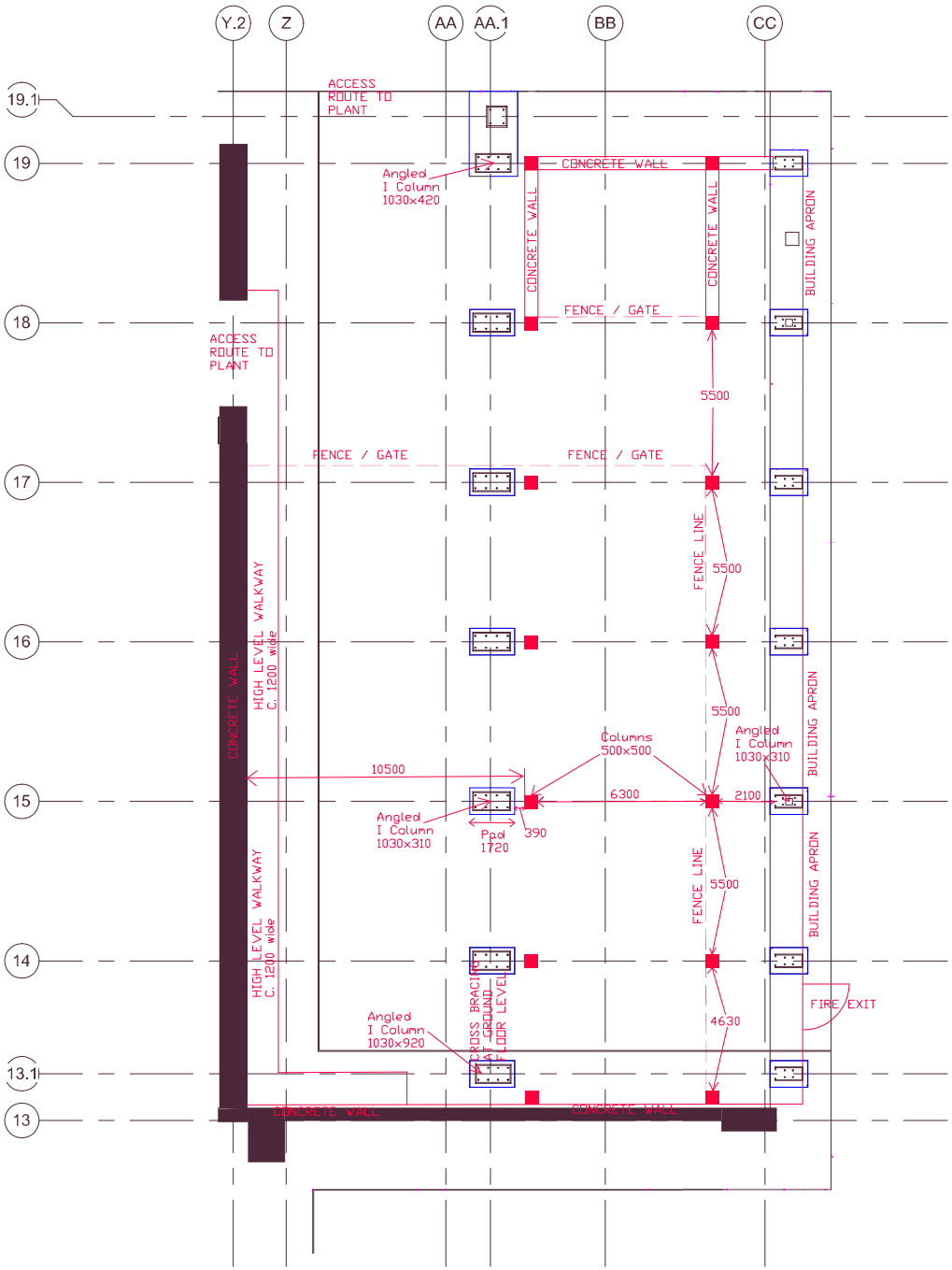
DCD Business Delivery Model and Engineering Rev

New Route Proposal

Projektnr.	Dato	Rev. dato	Mål	Tegning nr.	side
1100033276	2018-05-22	2018-06-13	1 : 1,250 @ A1 NTS@A3	dwg 2	5 of 5

LAM LL
Hannemanns Allé 53
DK-2300 København S

APPENDIX 3
DH AREA DWTE SKETCH



NOTE:

This drawing is an extract from HEGARTY's drawing entitled 'AS-Built Survey District Heating Area Holding Down Bolts' Drg No. PJH/DHA/10/20 Rev A Measurements and information coloured red were taken on the 31st May 2018

It should be noted that this District Heating area will require a complete and corrected survey prior to preliminary / detailed design.

Information contained on this sketch is provided purely for information purposes, and is to be used as a guide, the accuracy must be confirmed prior to decisions being made.

REVISION 1
The wall at Gridline 13.1 and 13 was corrected

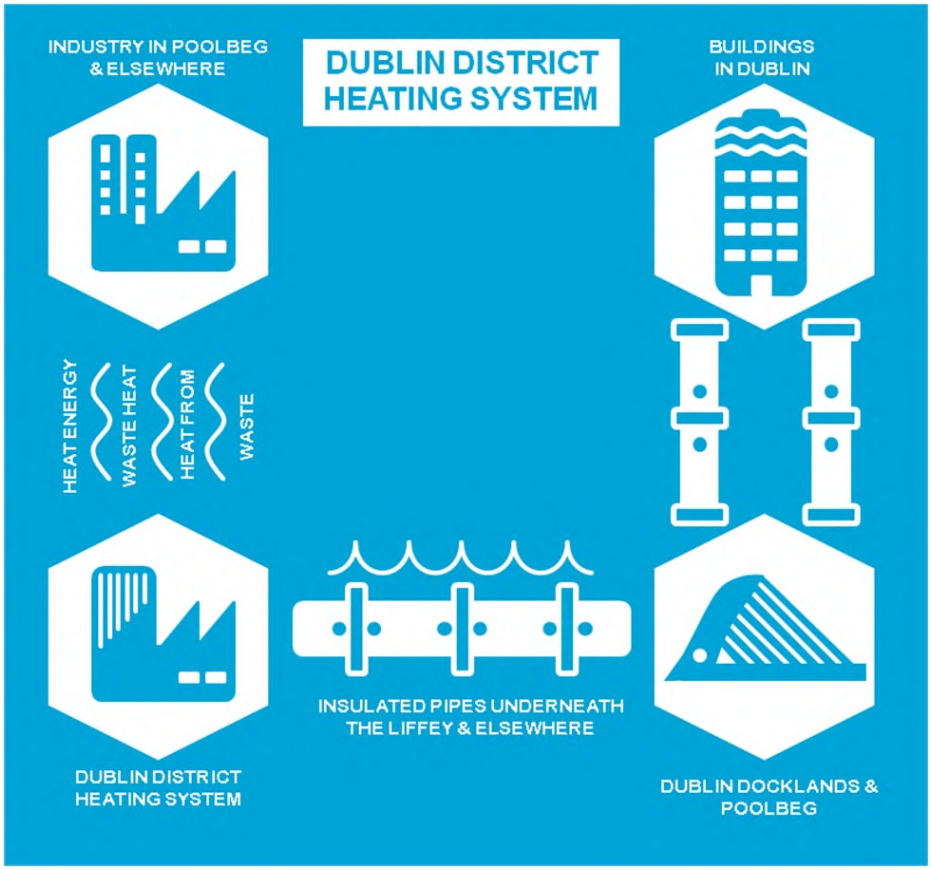
REVISION 2
The wall at Gridline 13.1 and 13 was slightly corrected, by moving the line of the wall behind the 500x500 columns.

APPENDIX 4
ENVIRONMENTAL DESKTOP REVIEW

DUBLIN CITY COUNCIL

DUBLIN DISTRICT HEATING SCHEME

HIGH LEVEL ENVIRONMENTAL ASSESSMENT DESKTOP REVIEW



July 2020

DUBLIN CITY COUNCIL

DUBLIN DISTRICT HEATING SCHEME

HIGH LEVEL ENVIRONMENTAL ASSESSMENT DESKTOP REVIEW

July 2020

PROJECT NO. 20756					
Revision	**Reason for Revision**	**Prepared by**	**Reviewed by**	**Approved by**	**Issue Date**
-	Initial Issue	SH/MH	EC	CAS	27/06/2018
A	Version for Client Review	SH/MH	EC	CAS	28/06/2018
B	Final Issue	EC	EC	CAS	07/07/2020

CONTENTS

1 INTRODUCTION

The focus of this Report is to carry out a formal and systemic high-level desktop assessment of the local environment in relation to the proposed Dublin District Heating System (DDHS) project (*i.e.* initial pipeline route corridors and potential location for DDHS infrastructure) and identify at this early stage in the design process any potential impacts/high level constraints in relation to the proposed Scheme and the surrounding environment.

The objective of this desktop assessment is to recommend studies/surveys where further assessments are deemed required.

1.1 Desktop Assessment Methodologies

This high-level assessment consisted of a desktop review of the existing literature and web-based datasets in relation to the various environmental interests, including National Parks and Wildlife Service, National Biodiversity Data Centre, IWeBS data, Record of Monuments and Places and EPA soil map.

Key sources of information relied upon in this assessment are listed below and detailed further in **Section 12** of this Report:

- Online data available on European sites as held by the National Parks and Wildlife Service (NPWS) from www.npws.ie
- Information on water quality in the area www.epa.ie and http://www.catchments.ie
- EPA maps http://gis.epa.ie/EPAMAps/
- Dublin Bay Area heritage maps https://heritagemaps.ie/WebApps/DublinBayArea/index.html
- EPA soil map gis.teagasc.ie/soils/map.php
- Satellite mapping https://www.openstreetmap.org/#map=14/53.2577/-6.1208, https://www.google.com/maps

1.2 Description of the Proposed Works

District Heating (DH) is a thermal energy network which distributes hot water or steam through insulated dual (supply and return) pipe lines to serve property energy demands. DH systems allow heat energy as distinguished from fuel to be bought and sold as a commodity. It offers advantages in terms of higher energy efficiencies, reduced consumption of energy resources and are fully compatible with European and National climate change policies and objectives for carbon dioxide reduction, energy efficiency, security of energy supply, sustainability and competitiveness.

The DDHS involves the development of a proposed District Heating System to recover and distribute waste heat primarily from the Dublin Waste to Energy (DWtE) Plant at Poolbeg Peninsula which has recently begun operations. A Medium Pressure Hot Water (MPHW) main transmission line from DWtE Plant in Poolbeg will be designed to carry the excess heat production of the DWtE Plant to potential consumers identified in the Docklands Strategic Development Zone and the Poolbeg West Strategic Development Zone. The network will be constructed using pre-insulated DH pipes according to the EN 253 specification (District heating pipes – Pre-insulated bonded pipe systems for directly buried hot water networks - Pipe assembly of steel service pipe, polyurethane thermal insulation and outer casing of polyethylene). The design is based on the international standard BE EB 13941: *"Design and installation of pre-insulated bonded pipe systems for district heating"*.

1.3 Location of the Proposed Works

The DDHS catchment area is shown in **Figure 1.1**. The Scheme area includes the North Lotts and Grand Canal Dock Strategic Development Zone (commonly called the Docklands SDZ) which is outlined in the dashed red shape to the left of **Figure 1.1**, and the Poolbeg West Strategic Development Zone (PWSDZ), which is outlined in the dashed and dotted red polygon. The area of Poolbeg Peninsula is outlined in blue, and has the PWSDZ included within it.

1.4 Timing & Duration of the Proposed works

The scheme is likely to be developed on a phased basis with the initial network infrastructure development proposed for the following areas:

- Poolbeg area from the Waste-to-Energy Plant to the Poolbeg West SDZ;
- Ringsend between the Poolbeg West SDZ and the southern shaft of the Liffey Tunnel
- The North Lotts area and
- The Grand Canal Area.

In the future the network may be extended to also include the proposed Trinity College Technology Enterprise Campus and the area north of Sheriff Street and North Lotts.

A construction duration of 24 months has been assumed for the purposes of this assessment which allows for the construction and installation of the District Heating network and Back-Up Boiler.

Seasonal restrictions on work in the vicinity of the SPA

In recognition of the sensitivity of many bird species in the adjacent *South Dublin Bay and River Tolka Estuary* SPA to noise and visual disturbance, the timing of construction works will be restricted in sensitive areas. For the purposes of this assessment, '*sensitive areas'* would include the land to the south of the Dublin Waste to Energy Facility, Sean Moore Park, Irishtown Stadium and Ringsend Park. There will be no seasonal restriction on work in any areas to the north of the River Liffey or to the north or west of Ringsend Park.

The SPA has been designated for the protection of a range of overwintering bird species, which migrate to Ireland in autumn, but return to their breeding grounds in sub-Arctic regions in spring. All construction work within sensitive areas will take place between May and September, inclusive. Pre-construction surveys will be undertaken in relevant areas to confirm that no birds are present in these areas at the time of works.

1.5 Details of the Proposed Works

A diagrammatic representation of the proposed DDHS is given in **Figure 1.2** and a brief description of the DDHS infrastructure is provided in the sub-sections below.

Heating System

The DH infrastructure will leave the DWtE Plant *via* an over ground pipeline gantry which will consist of approximately 150 m of overhead pipes. The remainder of the pipelines will be below ground pressurised trunk pipework including all branches and connections to individual buildings. Pipe sizes range from 50 mm dia. internal and 140 mm external to 600 mm dia. internal and 800 mm external. Most of the pipelines will be installed within the public roads, public parks and industrial lands.

There are three watercourse crossings included in the proposed scheme, one of which has already been completed. The River Liffey Crossing has been installed within the River Liffey Services Tunnel and connects Poolbeg Peninsula to the North Lotts Strategic Development Zone (SDZ). The other River crossings are across the River Dodder and the Grand Canal waterway. These crossings are to facilitate the developments located within the Grand Canal SDZ (**Figure 1.3**). It is proposed that both the Canal Basin and Dodder River crossings are constructed by trenchless technology to minimise potential impact on the watercourse. The proposed pipe size for the Canal Basin is twin DN 400 pipes while the proposed Dodder crossing consists of DN125 pipework these pipe sizes lend themselves to construction *via* micro tunnelling. No discharge or drilling fluids, bentonite or contaminated water will be permitted to the watercourse during the tunnelling works.

Barriers will be set up to demark the working zones; in particular, for excavation works. The carriageways; where present, will be sawcut, break out of surfaces will be completed

with an excavator with a breaker attachment and excavated to the required depth to accommodate a pipeline at 750 mm minimum cover. Localised reductions or increases in pipeline depth may be required to minimise impact on existing utilities. The excavated material will be removed to an appropriate permitted/licenced waste facility. All excavated material will be loaded directly on to an awaiting vehicle and be removed off site as above. In some instances (where the waste facility is closed due to works hours) the excavated material may need to be stored overnight. The material will be transported to temporary construction compounds.

There will be a requirement for storage compounds/temporary construction compounds along the DDHS route. These will consist of existing hard standing areas and will not require works to accommodate the storage of the DH pipes. The compound sites will store pipe, pipe fittings and will accommodate the offsite prefabrication for the welds to each pipe. It is proposed that the fill material will be delivered directly to site; however, there may be a need to store fill material at the compound sites. Plant and machinery will be housed overnight at these sites and at the construction location if sufficient space is available. Upon completion of the proposed works, the compounds will be restored to their original state.

Energy Station – Back-up boiler and Storage Tank

A peak-load/reserve boiler will be provided to ensure consistency of supply during periods of maintenance at the DWtE Plant. Under normal operation the reserve boiler is expected to be required for a period of three weeks twice a year.

The boiler house will be to the south of the DWtE Plant within the PW SDZ. There will be a flue approx. 30 m in height and 2.5 m in diameter and it is anticipated that the boiler will have an ultimate capacity of approx. 40 MW with a capacity of approximately 16 MW required initially. Plan dimensions of the boiler structure are expected to be 40 m x 20 m, with 2.5 m clear space surrounding.

Leakage/Damage Detection System

To ensure that the DDHS operates at a high efficiency level it is proposed to include a leakage detection system along all pipework to protect against leaks and damage. The DDHS will be monitored by a leak test alarm wire which is cast in to the pipeline insulation and monitored remotely.

1.5.1 Details of Previously Constructed Works to be Incorporated into DDHS

Existing planning policy within both the '*North Lotts and Grand Canal Dock Strategic Development Zone'* and '*Poolbeg West Strategic Development Zone'* requires that all proposed developments be '*District Heating Enabled'*. To connect to the DDHS, a development will be required to have installed:

- DH pipework within the street, connecting from the main transmission line to each heat exchanger. The sizing of the pipework will depend on the site's location in proximity to the heat sources on the DH Network and the heat load of the development.
- Heat exchangers to serve each building, or a group of buildings spaced close together.
- Consumer installations, including pipework, valves, apartment units and domestic hot water system, heat meters, radiators, under floor heating etc.

Several existing developments, particularly in the North Docklands/Spencer Dock area, have already included provisions for future connection to the DDHS. For future developments proposed connection details will be included for within individual planning applications as appropriate.

Depending on the size of individual developments to be served by the DDHS internal water treatment facility/pressure holding/pumping equipment may be required. These will be detailed on the individual planning applications for developments as required.

The following is a list of DH infrastructure that has been installed in advance of the DDHS, this infrastructure will be utilised as part of the scheme:

- Liffey Services Tunnel: This is approximately 300 m from point to point. The internal dimensions of the supply and return pipes are 508 mm (internal), while the external diameters are 710 mm for the flow pipe and 630 mm for the return pipe.
- New "*north south road*": Installation of approximately 280 m and 200 mm internal diameter and smaller in the new "*north south road*" alongside the 3Arena.
- Mayor Street: Approximately 248 m of DH pipe was installed under Mayor Street, as follows;
    - DH Pipe installation of various sizes up to 400 mm *dia*. ID laid in Mayor Street Upper, Park Lane (or Spencer Street as noted in some documents).
    - DH pipes under the Luas crossing of Mayor Street and a new proposed street which is provisionally named Spencer Avenue.
- New Wapping Street: Twin 600 mm pipe sleeves were installed under the LUAS for District Heating on the east side of the junction.
- Castleforbes: Space was left for future installation of DH pipes under the Luas crossing.

Figure 1.1: Location Plan of DDHS Area

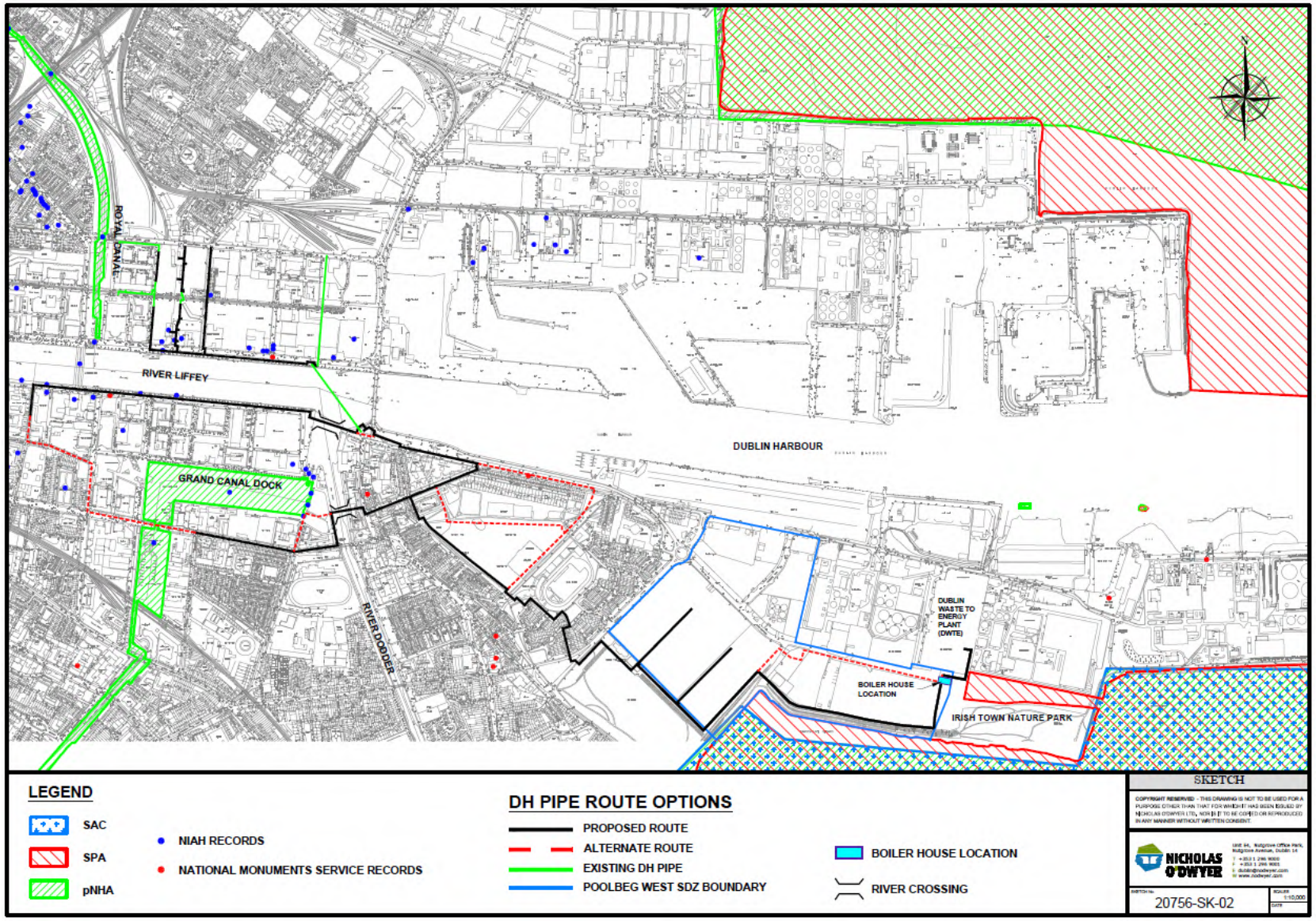


Figure 1.2: Dublin District Heating Scheme (DDHS) Infrastructure

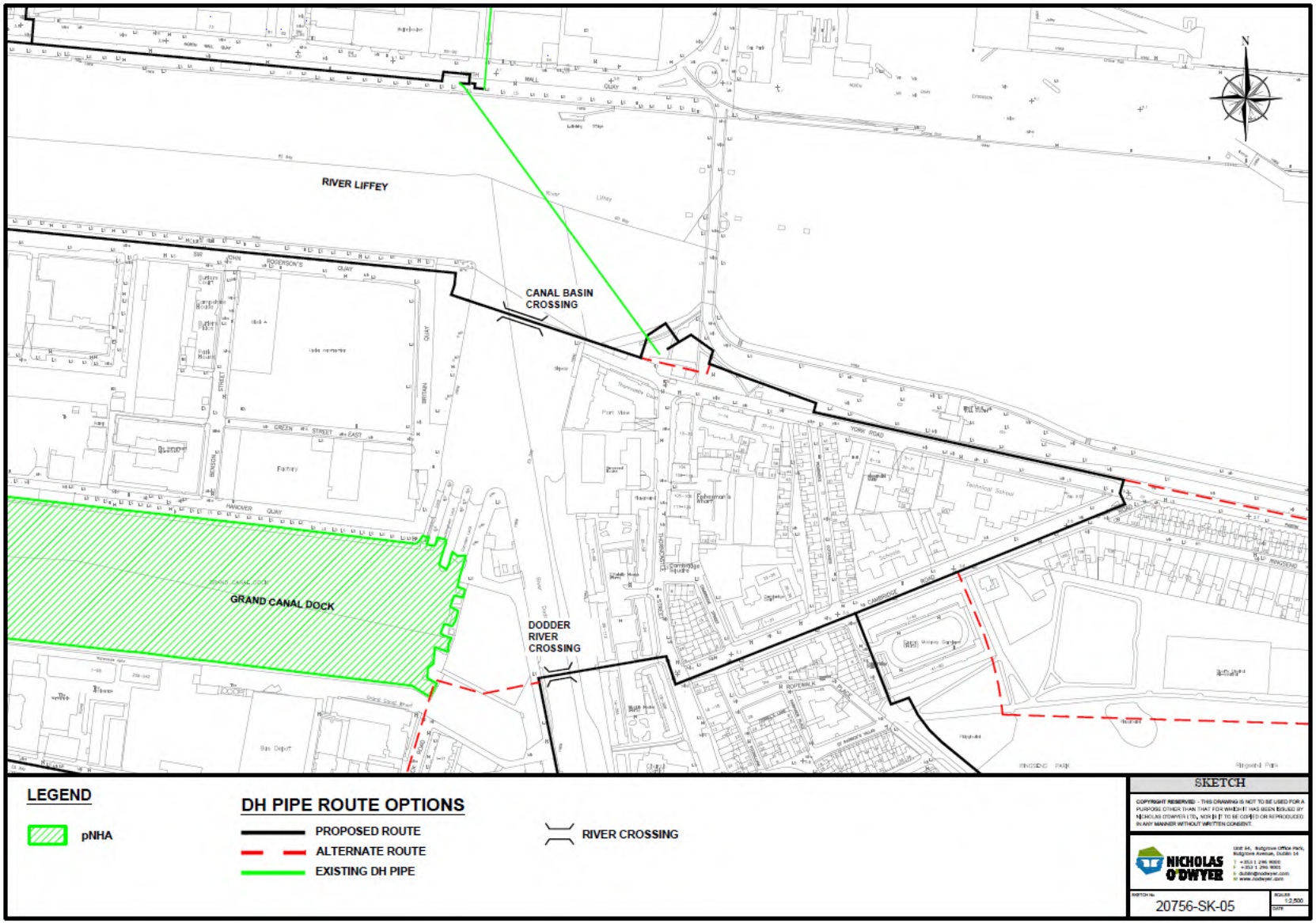


Figure 1.3: River Dodder and Canal Basin Crossings

2 BIODIVERSITY (FLORA AND FAUNA)

A desktop assessment was undertaken to determine the ecological receptors in the DDHS area which need to be considered during the lifetime of this Scheme. Below details the findings of this assessment.

2.1 Designated Sites

The National Parks and Wildlife Services (NPWS) map viewer was consulted (accessed on 15th May 2018 and 6th June 2018) and the following designated sites were identified within 10 km of the proposed DDHS area (see **Figure 2.1**):

Special Protected Areas (SPA)

- 004024 South Dublin Bay and River Tolka SPA, immediately adjacent to proposed works
- 004006 North Bull Island SPA, *ca.* 2.5 km from proposed works
- 000199 Baldoyle Bay SPA, *ca.* 8.5 km from proposed works
- 004113 Howth Head Coast SPA, *ca.* 9.5 km from proposed works
- 003000 Dalkey Islands SPA, *ca.* 10 km from proposed works

Special Areas of Conservation (SAC)

- 000206 North Dublin Bay SAC, *ca*. 2.5 km from site
- 000210 South Dublin Bay SAC, immediately adjacent to proposed works
- 000199 Baldoyle Bay SAC, *ca.*8.5 km from proposed works
- 000202 Howth Head SAC, *ca.*7.5 km from proposed works
- 003000 Rockabill to Dalkey Island SAC, *ca.* 7 km from proposed works

Proposed Natural Heritage Areas

- 000201 Dolphins, Dublin Docks pNHA, *ca.* 300 m from proposed works
- 000206 North Dublin Bay pNHA, *ca.* 1 km from proposed works
- 000210 South Dublin Bay pNHA, immediately adjacent to proposed works
- 002103 Royal Canal pNHA, immediately adjacent to proposed works
- 002104 Grand Canal pNHA, immediately adjacent to proposed works
- 000128 Liffey Valley pNHA, *ca.* 9 km from proposed works
- 000178 Santry Demesne pNHA, *ca.*6 km from proposed works
- 000199 Baldoyle Bay pNHA, *ca.*8 km from proposed works
- 000202 Howth Head pNHA, *ca.* 8 km from proposed works
- 001205 Booterstown Marsh pNHA, *ca.*4 km from proposed works
- 001206 Dalkey Coastal Zone and Killiney Hill pNHA, *ca.* 8 km from proposed works
- 001753 Fitzsimon's Wood pNHA, *ca.* 8.5 km from proposed works
- 001763 Sluice River Marsh pNHA, *ca.* 9.5 km from proposed works

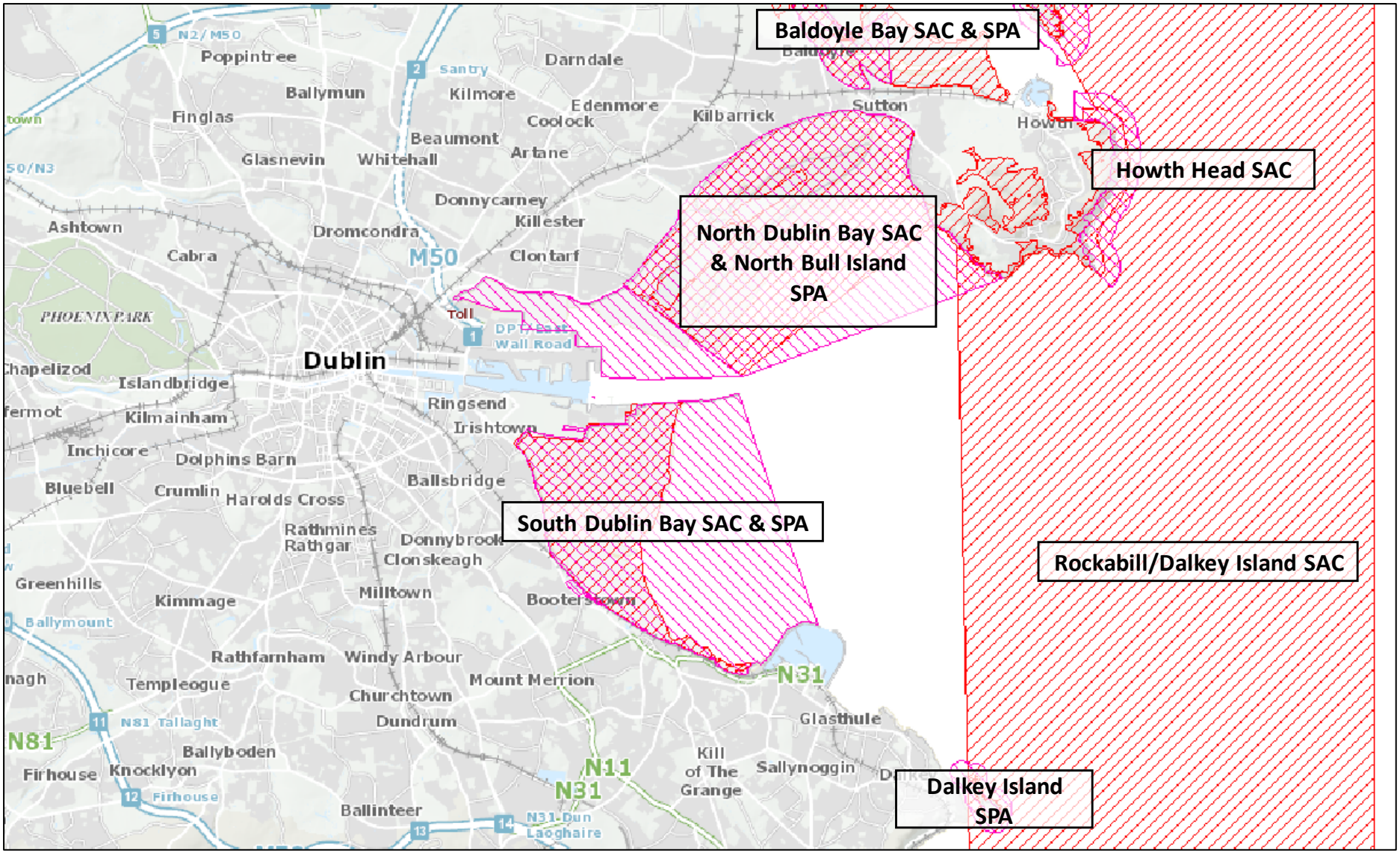


Figure 2.1: Natura 2000 sites within 10 km of the proposed DDHS area

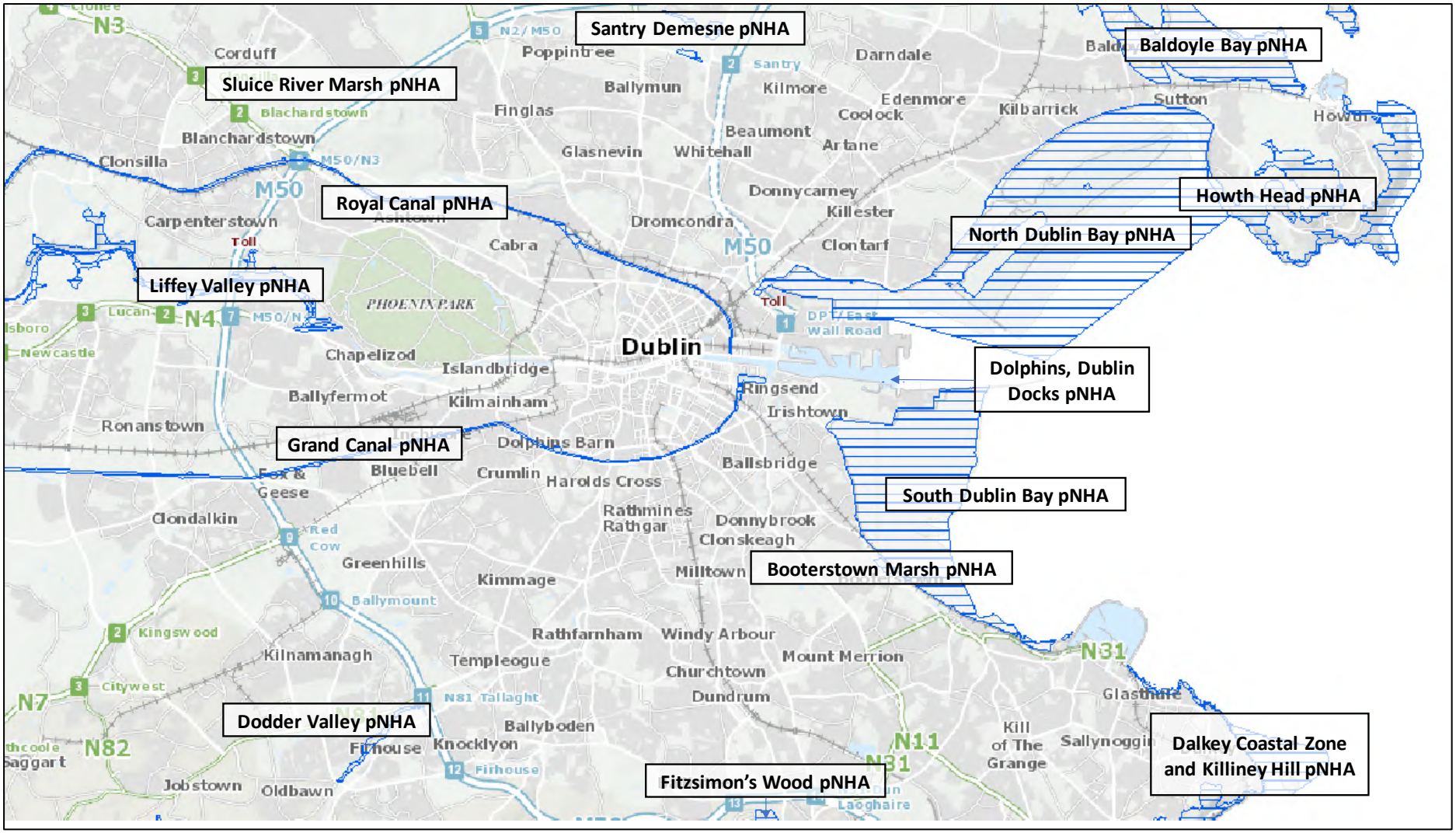


Figure 2.2: pNHA within 10 km of the proposed DDHS area

The River Liffey itself, while not designated, is designated as a pNHA approximately 9 km upstream of the Poolbeg Peninsula. The River Liffey is an important salmonid system with resident populations of brown trout and migratory populations of Atlantic salmon and sea trout.

In relation to impacts on "*pathway*" receptors (*i.e.* River Liffey, Grand Canal, Dublin Bay) to these designated sites, with appropriate environmental protection measures employed for the duration of the construction works (*e.g*. construction works to conform to the Inland Fisheries Ireland guidelines on works at river sites and Section 3 of the Local Government (Water Pollution) Act, 1977)), no impacts on the aquatic environment and the proximate sites, including the pNHAs, are anticipated.

Due to the proximity of the works to the SPA and known feeding sites, there is potential for impacts to wintering birds; however, due to the detailed design methodology, including seasonal timings of the works and standard practice pollution/sediment control measures, which will be an integral component of the development design, no impacts are anticipated from the construction of the proposed DDHS, alone or in combination with other projects, on the protected bird species of this area. As stated above, the timing of construction works will be restricted in sensitive areas. '*Sensitive areas'* include the land to the south of the DWtE Plant, Sean Moore Park, Irishtown Stadium and Ringsend Park. All construction work within sensitive areas will take place between May and September, inclusive. Pre-construction surveys will be undertaken in relevant areas to confirm that no birds are present in these areas at the time of works.

No operational impacts are anticipated from the proposed DDHS, alone or in combination, with other projects.

2.2 Areas of Special/Public Interest

Irish Town Nature Park, while not designated, is a manmade area of public amenity which, supports some species of birds and notable flora and fauna spp. and includes several km of public walking trails. The proposed scheme, although proximate to the park, does not enter park lands. Some works will be completed within/proximate to the access paths. These paths are of bare ground or hardstanding material. Within the integration of the detailed design measures which will form an integral part of the project design, no significant impacts are likely from the proposed DDHS, alone or in combination with other projects.

2.3 Protected Species

The National Biodiversity Data Centre was accessed to assess the presence of protected species within the proposed DDHS area. The records for protected species within the 1 km grid squares within the scheme area (O2233, O2133, O2033, O1933, O1833, O1834, O1733, and O1734) are detailed in **Table 2.1** below. Only recent data records are included (2011-2018).

Table 2.1: Protected species identified and recorded (2011-2018) (National Biodiversity Data Centre) within the scheme area.

1 km Grid Square	Species
O2233	Dunlin
O2133	Common Starling, Common Shelduck, Common Linnet, Black-headed Gull
O2033	Bar-tailed Godwit, Brent Goose, Common Tern, Great Black-backed Gull, Great Cormorant Pipistrelle
O1933	Black-headed Gull, Common Linnet, Common Redshank, Common Wood Pigeon, Eurasian Curlew, Eurasian Oystercatcher, Red Knot Small Cudweed Grey Seal
O1833	Common Redshank, Eurasian Oystercatcher Daubenton's Bat, Common Pipistrelle, Soprano Pipistrelle
O1834	Mew Gull European Otter
O1733	Black-headed Gull, Common Tern, Great Cormorant, Herring Gull, Mallard, Mute Swan, Tufted Duck Brown Long-eared Bat, Lesser Noctule, Pipistrelle European Otter
O1734	Black Guillemot, Black-headed Gull, Common Tern, Herring Gull, Little Egret, Mallard, Mute Swan Lesser Noctule, Common Pipistrelle, Soprano Pipistrelle

Due to the built-up environs of the DDHS area it is considered that there is limited potential for protected species to be present within the DDHS area, however an Ecological walkover survey is recommended, the aim of which will be to identify the occurrence and distribution of habitats and species within the DDHS area, including those listed under Annex I and Annex II, respectively, of the EU Habitats Directive.

2.4 Appropriate Assessment Screening

An Appropriate Assessment Screening has been prepared in accordance with the Habitats Directive 92/33/EEC (2000) to specifically assess if the construction or operation of the proposed DDHS, individually or in combination with other plans or projects, is likely to have a significant effect(s) on Natura 2000 sites with specific reference to the South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, North Dublin Bay SAC and North Bull Island SPA.

The AA Screening concluded that it could be excluded at this stage that the construction and operational activities associated with the proposed Scheme, individually or in combination with other plans or projects, will have a significant effect on the Natura 2000 Network. Accordingly, it was concluded that an Appropriate Assessment of the proposed Scheme is not required. Refer to **Appendix B of the Ramboll Dublin District Heating System Engineering Review Report** for a copy of the Appropriate Assessment Screening Report.

2.5 Invasive Species

The National Biodiversity Data Centre was consulted to determine the presence of non-native invasive species (NNIS) within the Scheme area. Several NNIS were recorded. Those listed on the "*Third Schedule*" of S.I. No. 477/2011 are detailed below and if present within the Scheme development area trigger the need for an Invasive Species Management Plan.

- Japanese knotweed
- Himalayan balsam
- All Waterweed spp.
- Sea-buckthorn

An invasive species survey is recommended to confirm the presence or absence of these species along the proposed Scheme route.

There is no evidence to suggest at this high-level desk top stage that there will be impacts, of a magnitude, extent or duration, detrimental to Biodiversity (flora and fauna) from the proposed DDHS.

Recommended Assessments/Surveys

Based on the above, it is recommended that the following surveys are carried out:

- Ecological walkover survey of the entire DDHS area and immediate environs to confirm the findings of the high level desktop assessment.

- Invasive species survey of the DDHS area and preparation of an Invasive Species Management Plan, if "*Third Schedule*" invasive species are identified within the Scheme area or within any temporary working areas required for the construction of the Scheme.
- Pre-construction bird survey, in relevant sensitive areas, to confirm that no birds are present the time of works.

3 ARCHAEOLOGY & CULTURAL HERITAGE

An initial appraisal of the DDHS area, using the heritage maps database, indicates the presence of a rich and diverse cultural heritage, particularly maritime. More than 150 records were identified within the scheme area (excluding redundant records and including a 500 m buffer zone), including settlement clusters, grave-slab, graveyard, seawall, Samuel Beckett Bridge and North Wall Quay. Furthermore, archaeological deposits or artefacts may be present below the ground surface near these sites (**Figure 3.1**).

As per the Poolbeg Peninsula Planning Scheme and the National Monument Service of the Department of the Environment database, the Pigeon House Road and Great South Wall have been identified as Zones of Archaeological Interest and the Great South Wall is also classified as an Archaeological Conservation Area.

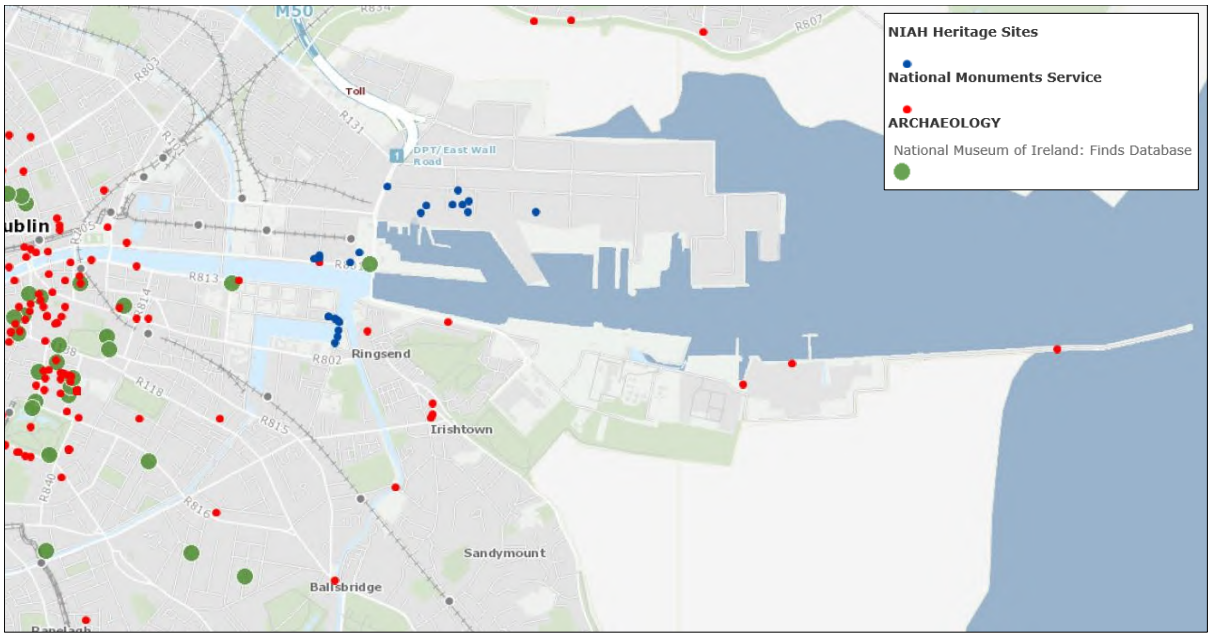


Figure 3.1: Records of Heritage Sites within the Scheme Area.

To ensure there is no significant construction impacts on archaeology/cultural heritage in the area it is recommended that a detailed assessment is carried out at the detailed design stage of this Scheme.

At this stage, it is anticipated that some archaeological monitoring will be required during the construction phase of the works and associated site investigations.

No operational archaeological impacts are anticipated from the proposed DDHS, alone or in combination with other projects.

Recommended Assessments/Surveys

Based on the above details it is recommended that the following assessment are carried out:

- Detailed Desktop Archaeological Assessment to be carried out at the detailed design stage of this Scheme.
- It is anticipated that archaeological monitoring will be required during the construction phase of the works and associated site investigations.

4 MATERIAL ASSETS & HUMAN BEINGS

As detailed in the Dublin Port Masterplan 2040, the Dublin Port area, in which the proposed DDHS is contained, is a key material asset nationally which handles approximately 50% of Ireland's trade. The main activity of the Port is freight handling. Regarding the construction works, most of the works will be within the road and public footpaths only. This excludes the portion within the Poolbeg SDZ which crosses industrial and privately-owned lands. The population of the Scheme area was estimated using the CSO 2016 data for electoral divisions. The electoral divisions assessed are greater in area than the proposed Scheme area, as such the population calculation is likely over estimated; however, it provides a significant estimation of the current density of the area. The population was estimated at approximately 24,500.

A summary of the areas and receptors adjacent to or proximate the proposed DDHS work areas are tabled below.

Table 4.1: Areas and Receptors adjacent to or proximate the proposed DDHS

Street/Location	Surrounding Area	Primary Use
Poolbeg SDZ	DWtE Plant	Industrial
Poolbeg SDZ	Irishtown Nature Park	Recreation
Poolbeg SDZ	Former Irish Glass Site	Development / Residential
Poolbeg SDZ	Sean Moore Park	Recreation
Sean Moore Road R131	Regional Road	Transportation
Bremen Ave.	Bremen and Kerlogue Housing	Residential
Irish Town Stadium Surrounding Grounds	Irish Town Stadium	Recreation / Residential
Ringsend Park	Ringsend Park Boundary	Recreation
Cambridge Park Road	Cambridge Park Housing	Residential
Cambridge Road	Mixed Use Development	Schools / Colleges / Residential
River Dodder Crossing (South)	O'Rahilly Housing Sacred Heart Shrine	Residential / Worship
Spencer Dock Road	Graving Dock	Industrial

Street/Location	Surrounding Area	Primary Use
Bridge Street R802	Camden Lock Shelbourne Park Apartments	Residential / Commercial
Ringsend Road R802	Mixed Use Development	Residential / Commercial
York Road	Mixed Use Development	Parking / Amenity Grassland
River Dodder Crossing (North)	Saint Patricks Rowing Club	Recreation
Capital Dock	Capital Dock	Industrial
Sir John Rogerson's Quay	Commercial Development & Campshire associated amenity	Commercial / Amenity
Lime Street	Commercial Development	Commercial
North Wall Quay	Mixed Use Development	Commercial / Amenity
New Wapping Street	Mixed Use Development	Commercial / Residential
Wapping Street	Mixed Use Development	Commercial / Residential
Park Lane	Mixed Use Development	Commercial / Residential

Works are required on commercial and/or private property and therefore there will be short term direct impacts arising from the proposed Scheme and associated site investigations on properties or premises near the works. Similarly, the works cross access routes to public amenities, including Sean Moore Park, Irish Town Stadium and Irish Town Nature Reserve. The impact to amenity areas will be Temporary and slight in nature with access required to be maintained at all times.

In relation to public amenities nearby it is considered that the proposed works, alone or in combination with other projects, will not directly impact upon the use of these facilities.

At present there is car parking within the proposed scheme area which will be temporarily impacted.

The installation of the DDH pipework will likely require lane and road closures on some sections of the route, these will also be temporary in nature.

The anticipated potential impacts on human beings and material assets from the proposed works are summarized below:

- Temporary slight disruption to road traffic
- Temporary slight disruption to pedestrian traffic
- Temporary slight disruption to amenity areas
- Temporary slight disruption to other construction works in the area
- Temporary slight loss of car parking

Most of the construction impacts are individually temporary in nature but the impacts from the scheme are predicted to be short-term effects. The key impact anticipated is the potential disruption to traffic and parking. A detailed Construction Stage Traffic Management Plan will be required to be prepared and implemented for the duration of the works and early liaison with affected parties will need to be carried out to ensure access is maintained to residential and commercial properties and that disruption to the community is minimised.

The operation of the DDHS is predicted to have a positive significant long-term effect. The DDHS is listed as a one of the strategies to lessen climate change contributing factors. The Scheme is anticipated to provide a competitively costed alternate energy supply and will facilitate future residential industrial and commercial development. The Scheme will utilise the emissions otherwise released from the DWtE Plant. There is potential for other industrial/commercial facility emissions to be utilised in this manner further reducing emissions to the environment/atmosphere.

Recommended Assessments/Surveys

Based on the above details it is recommended that the following assessment are carried out:

- A Traffic Impact Assessment is recommended to accurately assess potential construction impacts.

5 NOISE & VIBRATION

During the construction phase of the DDHS there is likely to be a temporary negative impact on nearby properties due to noise emissions and vibration from site traffic and other activities. Given that the site is predominantly an industrial area (including terminals and berths, oil storage terminals and container storage areas with quayside loading and unloading operations) with a large volume of daytime road traffic and construction sites, it is considered that construction noise and vibration from the works will not be excessively intrusive and will be of a similar nature to noise generated in the area at present. The EPA map noise levels within the Dublin Road Scheme (monitoring completed by the NRA). Within the area of the proposed works the highest value of 75-90 Db has been recorded.

Construction will be required to comply with *BS 5228-1:2009 Noise and vibration control on construction and open sites*. BS 5228 sets out permissible noise levels relative to the existing noise environment and time of day. As the works will be carried out in compliance with BS 5228, including the implementation of appropriate noise and vibration control measures, no significant impacts on the surrounding community are anticipated. Where pipelines are to be constructed by trenchless techniques *e.g.* at the River Dodder and Canal Basin crossings additional monitoring of adjacent properties will be put in place to ensure that vibrations do not impact on any existing structures.

6 AIR & CLIMATE

The proposed works are within Air Zone A as outlined in the Air Quality Standards Regulations (2011). Dublin city's air quality is classed as '*Good*' according to the EPA air quality index. 2018 monitoring for NO_2 and SO_2 are both within the relevant limits (Air Quality Regulations 2011). There have been exceedances at this site in relation to particulate matter (PM10) in 2018. Breaches in NO_2 have been recorded in the past.

As per the Dublin Port Masterplan 2040, the predicted impacts from climate change are likely to include, increases in the frequency and volume of rainfall, increases in peak flows, rise in sea levels and increased storminess and coastal squeeze impacts on biodiversity associated with sea level rise. Climate Change Strategy for Dublin City (2008-2012) (The Environment & Engineering Strategic Policy Committee in association with CODEMA (City of Dublin Energy Management Agency)) contains strategies to lessen climate change contributing factors. This includes, amongst others, the DDHS.

There is the potential for emissions to the atmosphere during the construction phase of the works (*e.g.* dust). Best practice construction procedures will be employed to manage dust associated with the works. In addition, the works will be required to comply with relevant regulations to ensure the impacts are minimised.

Given the size and nature of the proposed works and the nature and volume of emissions anticipated from the works and compliance with standard environmental protection measures, it is considered that there will be no significant impact on atmospheric conditions, alone or in-combination with other projects.

7 LANDSCAPE & VISUAL

There will be no permanent landscape and visual impact from the proposed DH pipeline network, the majority of the which will be below ground. Post construction impacts are considered to be imperceptible and neutral. A short section of the exit pipework from the DWtE Plant will be *via* an above ground gantry of approximately 150 m. Given the location of this pipework within an existing industrial site, the cumulative impact of this additional above ground pipework on the landscape is likely to be negligible however a Landscape and Visual assessment of the above ground section of the pipeline is recommended.

During construction of the DH pipelines there will be a temporary negative impact; however, for most of the route, this is considered to be minor in scale given the nature of the current environment *i.e.* ongoing construction/freight handling works and therefore not deemed to be significant. For works proximate to amenity areas, west of the Poolbeg Peninsula and including Ringsend Park, Irishtown Stadium and Sean Moore Park and some residential areas, including the O'Rahilly House developments, there will be significant negative impacts, however, these will be Temporary in nature. Furthermore, the landscape will be returned to original state post construction.

Figure 8.1: Energy Station Proposed Location

There is potential for a landscape and visual impact from the proposed Energy Station (**Figure 8.1**) which comprises a peak load reserve boiler, storage tank and district heating pumping station in combined structure. The energy centre will require a flue approx. 30 m in height and 2.5 m in diameter. It is anticipated that the peak load reserve boiler will have an ultimate capacity of approximately 40 MW with a capacity of approximately 16 MW required initially. Plan dimensions of the boiler structure are expected to be 40 m x 20 m, with 2.5 m clear space surrounding. The Energy Station is located within the Poolbeg SDZ and as such will consider the requirements as set out for development within this zone. These structures will cause a permanent impact in terms of landscape and visual and as such a Landscape and Visual assessment of these structures is recommended.

Recommended Assessments/Surveys

Based on the above details it is recommended that the following assessment are carried out:

- Landscape and Visual Assessment of the proposed Energy Station and the short section of the exit pipework from the DWtE Plant.

8 SOILS, GEOLOGY & HYDROGEOLOGY

The urbanized area of Dublin city and County is roughly delineated by the M50 motorway. Inside this area, from the M50 eastward towards the Irish Sea, the ground is low lying excluding minor hills to the North and South of Dublin, at Howth and Killiney. As per the EPA soil map (gis.teagasc.ie/soils/map.php), the soil association within the proposed scheme area is *Urban*, *i.e.* due to the extremely urbanized nature of the area there is no defined associated soil series composition where few original soils remain.

There are several licensed waste facilities, IPC and IED, within the proposed scheme area. As the location is highly urbanized, facilitates high density industrial and waste developments with high traffic volumes, it is possible that there are contaminated soils within the proposed scheme area. Contaminants known to be present in the area include lead, arsenic, benzo(a)pyrene and PAHs; however, given the high density of services along the proposed scheme area it is possible that any contaminated ground may have been already removed during the installation of other utilities.

Dublin Groundwater, as per the WFD (2010-2015) is assigned "*Good*" Status. The direction of groundwater is to the South to South East. The proposed Scheme is contained within an area where groundwater vulnerability is Low and subsoil permeability is also Low. The groundwater within the area is a Locally Important Aquifer with Bedrock which is Moderately Productive only in Local Zones. As per the Docklands Assessment Report, there are five abstractions reported within a 1.5 km radius of the works, two on Sheriff Street Upper, with unspecified uses, recorded on the Geological Survey of Ireland's webmap (gsi.ie). Three further wells are located south of the River Liffey. The Docklands groundwater aquifer classification on the gsi.ie webmap is the same as much of Dublin city: '*locally important aquifer - bedrock is moderately productive only in local zones*'. As per the Poolbeg Planning Scheme 2009 EIS (*now EIAR*), the groundwater within the area is likely to be brackish due to saline intrusions form the Liffey Estuary, as such is not suitable as drinking water, the above abstractions are likely for industrial use. Furthermore, it is unlikely that groundwater within the Poolbeg Peninsula area will be used for drinking water in the future. Nevertheless, and in line with the EU Groundwater Directive groundwater, regardless of use must be protected. IT is not anticipated that the proposed Scheme will lead to any reduction in groundwater quality.

Site investigations and environmental testing are recommended in advance of the DDHS pipeline works commencing to identify locations of possible contamination along the proposed pipeline routes. The results of these investigations will allow the most appropriate mitigation measures to be determined and included in the detailed design of the pipelines.

With the implementation of appropriate construction measures, it is envisaged at this stage that there would be no impact from the proposed works in terms of Soil, Geology and Hydrogeology.

Recommended Assessments/Surveys

Based on the above details it is recommended that the following assessment are carried out:

- Site investigations and environmental testing are recommended.

9 SURFACE WATER

There are several surface waterbodies proximate to the proposed DDHS works area, as detailed below and shown in **Figure 5.1** above.

The watercourses within the Dublin City area are highly modified, weirs, culverts and man-made banks are present along most of their course within the city. All the waterbodies, detailed below, converge around Dublin Port and the proposed DDHS area. The proposed scheme consists of two new river crossing, across the River Dodder and the Canal Basin (**Figure 1.3**). The methodology for these crossings are detailed in **Section 1.3** of this Report.

Dublin Bay

Dublin Bay, as per the WFD (2010-2015) is assigned *Good* Status with high nutrient conditions. The following EPA monitoring stations are relevant to the proposed DDHS; DB120, DB210, BD220, DB410, DB420, DB430 and DB450. The above stations were sampled and assessed against surface water quality parameters (S.I. No. 272 of 2009). All relevant monitoring stations were compliant with the surface water regulations, excluding DB410 and DB420 which both had elevated levels of Phosphorous. These breaches in Phosphorous are considered to be as a result of an SWO impact from the Ringsend WwTP.

River Liffey Estuary

The Liffey Estuary Lower, as per the WFD (2010-2015) is assigned "*Moderate"* status and is considered to be "*At Risk*" of not achieving "*Good"* status. As per the EPA biological assessment in 2016, ecological conditions were found to be satisfactory at the majority (12) of the 16 stations surveyed on the River Liffey. The macroinvertebrate community indicated a continuation of unsatisfactory "*Moderate*" ecological conditions at Ballymore Eustace (0400, 0500), at Oberstown (1200) and Chapelizod (2360). For the first time in several decades a welcome improvement to good conditions (Q4) occurred both at Leixlip Bridge (1900) and further downstream at Lucan (2100). However, a note of caution is advised regarding this recovery as there were still signs of nutrient pressure with significant amounts of filamentous algae. The protected crayfish *Austropotamobius pallipes* was observed at Ballymore Eustace (0400), New Bridge (0600), Kilcullen (0700), Connell Ford (0850), Clane (1500), Straffan (1600), Celbridge (1700) and at Leixlip Bridge (1900).

River Dodder

The Dodder River, as per the WFD (2010-2015) is assigned "*Moderate*" status and is at Risk of not achieving "*Good"* status. As per the EPA biological assessment in 2016, the macroinvertebrate community indicated satisfactory "*Good*" ecological conditions at the

two stations sampled in the upper reaches (0010 and 0100). Unfortunately, a deterioration was recorded for the remaining three lower stations. Station 0300 (Old Bawn) declined from "*Good"* to "*Moderate*" ecological condition, station 0620 (Rathfarnham) declined from "*Moderate*" to "*Poor"* and station 0900 (Beaver Row) declined from *Good"* to "*Moderate*".

Royal & Grand Canal

Canals are artificial waterbodies classified based on their ecological potential rather than their ecological status. As per the 2010-2015 EPA Water Quality in Ireland Report the Royal and Grand Canal are both considered to be of "*Good"* ecological potential.

There will be no discharges permitted to any of the above watercourses. Potable water only will be used for pipe testing. Pipes are to be filled slowly in consultation with DCC to minimise the impact on the water network. Water used for the DDHS pipe testing will be released to the foul network in a controlled manor.

There is potential for accidental spillages or sediment run off to the aforementioned waterbodies during construction; however, in line with best practice construction methodology and IFI approved river crossing method statements, no significant risk to surface waters exists during the construction of the proposed DDHS. With best practice environmental design and construction measures being implemented throughout the construction stage of the Scheme, it is not envisaged that there will be any impact on aquatic bodies from the proposed works.

There are no operational impacts anticipated in relation to surface waters from the proposed Scheme. There are no emissions to waterbodies permitted/necessary during the operation of this Scheme.

10 RECOMMENDATIONS

Based on the above high-level desktop environmental assessment, it is recommended that the following environmental surveys/studies be carried out:

- Ecology Walkover Survey
- Invasive Species Survey, and Management Plan (if required after survey)
- Pre-construction Bird Survey, in relevant sensitive areas, to confirm that no birds are present the time of works.
- Detailed Archaeological Desktop Assessment
- Construction Stage Traffic Impact Assessment
- Site Investigations and Environmental Testing
- Landscape and Visual Assessment

11 REFERENCES & SOURCES OF INFORMATION

National Inventory of Archaeological Heritage
National Monuments Service
Dublin City Development Plan 2016-2022
Dublin Port Masterplan 2014
Dublin Port Master plan 2014
Met Erin Historical Data
Climate Change Strategy for Dublin City (2008-2012)
gis.epa.ie/Envision
gis.epa.ie/EPAMaps/
2010-2015 EPA Water Quality in Ireland Report
(https://www.epa.ie/pubs/reports/water/waterqua/Water%20Quality%20in%20Ireland%202010-2015.pdf)
Geological Survey Ireland Spatial Resources
https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228
Ringsend WWDL 2017 AER
(https://www.dublincity.ie/sites/default/files/content/WaterWasteEnvironment/WaterSupplyProjectDublinRegion/WaterSupplyProjectDublinRegion/Documents/The%20Plan%20Appendix%20C.pdf)
(gis.teagasc.ie/soils/map.php)
(https://www.dublincity.ie/sites/default/files/content/WaterWasteEnvironment/WaterSupplyProjectDublinRegion/WaterSupplyProjectDublinRegion/Documents/The%20Plan%20Appendix%20C.pdf)
Poolbeg Planning Scheme EIS (2009)
http://www.dublindocklands.ie/sites/default/files/Planning/Historical%20Schemes/Poolbeg/ENV%20IMP%20stat/Section%207%20-%20Geotechnical%2C%20Soils%20and%20Ground%20Conditions.pdf
Geological maps, Geological Survey of Ireland (GSI) (www.gsi.ie)
Groundwater quality status maps (watermaps.wfdireland.ie)
Teagasc Subsoils map (gis.epa.ie/Envision)
Water Features, Rivers and Streams, EPA (gis.epa.ie/Envision)
Geological Heritage Areas, GSI
Protected areas, Biodiversity Ireland (maps.biodiversityireland.ie)
Integrated Pollution Control (IPC) and Industrial Emissions (IE) Licences, EPA
Historic Maps from the Ordnance Survey of Ireland (www.osi.ie)

Ordnance Survey of Ireland mapping and aerial photography available from www.osi.ie;
Online data available on European sites as held by the National Parks and Wildlife Service (NPWS) from www.npws.ie;
Information on water quality in the area, available from www.epa.ie & Dublin City. Co.;
EPA Catchments.ie http://www.catchments.ie;
EPA Maps http://gis.epa.ie/EPAMAps/;
NPWS Conservation Objectives https://www.npws.ie/protected-sites/conservation-management-planning/conservation-objectives
EPA Catchments.ie http://www.catchments.ie;
EPA ENVision http://gis.epa.ie/Envision;
EPA, Envision Map Viewer. Available at: http://gis.epa.ie/Envision.
NWPS databases and Map. Available at: http://webgis.npws.ie/npwsviewer/.
NPWS (2013). Site Synopses. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
NPWS (2012) Conservation Objectives. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
Ordnance Survey Ireland (2015). Mapviewer. Available at: http://maps.osi.ie/publicviewer/#V1,588882,739883,0,10
Water Framework Directive databases and Map. Available at: http://watermaps.wfdireland.ie/NsShare_Web/.
Dublin Agglomeration Draft Environmental Noise Action Plan (2013-2018) http://www.dublincity.ie/sites/default/files/content//WaterWasteEnvironment/NoiseMapsandActionPlans/Documents/Draft%20Dublin%20Noise%20Plan%202013-2018.pdf
Ringsend Wastewater Treatment Plant Upgrade Environmental Documents https://www.water.ie/planning-sites/ringsend-planning/environmental-documents/

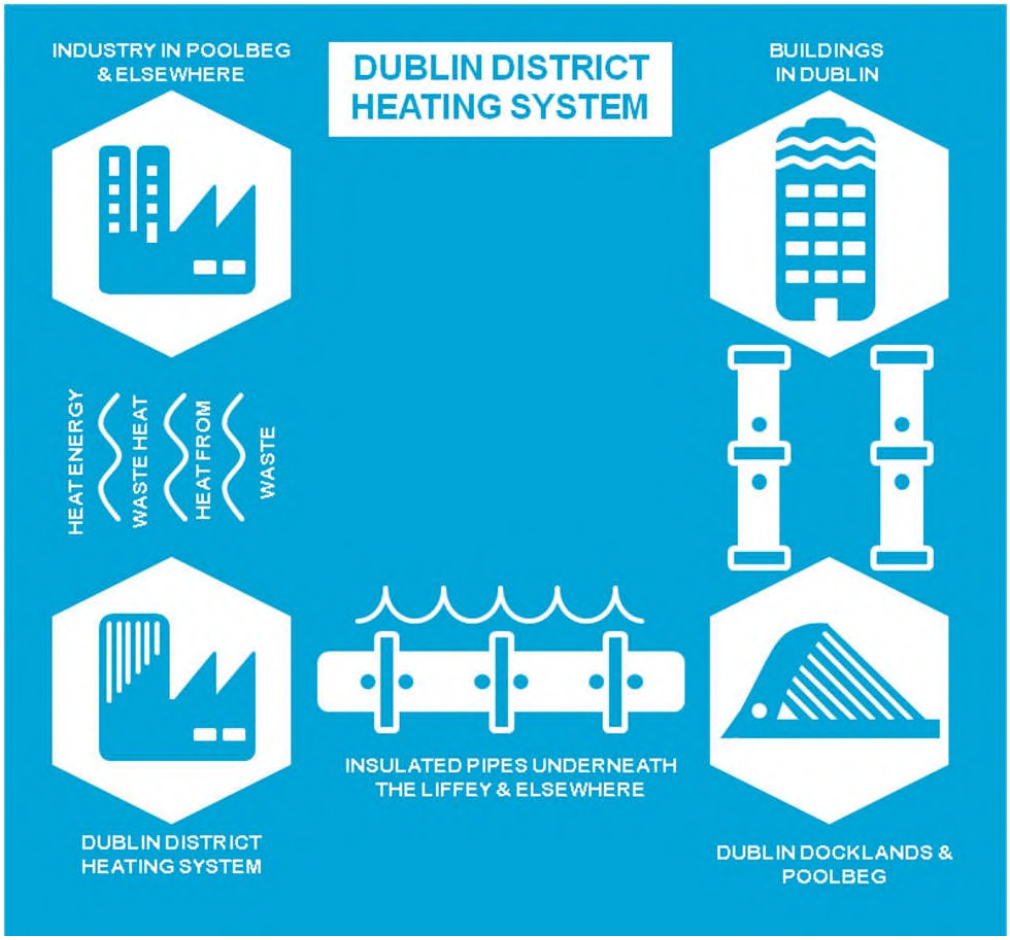
APPENDIX 5
APPROPRIATE ASSESSMENT SCREENING REPORT

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

DUBLIN CITY COUNCIL

DUBLIN DISTRICT HEATING SCHEME

AA SCREENING REPORT



July 2019

NICHOLAS O'DWYER

NM ECOLOGY

DUBLIN CITY COUNCIL

DUBLIN DISTRICT HEATING SCHEME

AA SCREENING REPORT

July 2019

PROJECT NO. 20756					
Revision	**Reason for Revision**	**Prepared by**	**Reviewed by**	**Approved by**	**Issue Date**
-	Initial Issue	NOD/NM	SH	CAS	27/06/2018
A	Issue for Client Review	NOD/NM	SH	CAS/EPC	29/06/2018
B	Revised for Client Sign Off	NOD/NM	NM	CAS	15/07/2019

CONTENTS

1 INTRODUCTION

This report, prepared by Nicholas O'Dwyer Ltd. and NM Ecology Ltd. on behalf of Dublin City Council (DCC), provides an Appropriate Assessment (AA) Screening of the construction and operation of the proposed Dublin District Heating Scheme (DDHS). This report assesses whether the proposed Scheme, alone or in combination with other plans and projects, is likely to have significant effects on the Natura 2000 network, and in particular on the nearby *South Dublin Bay SAC*, *South Dublin Bay and River Tolka Estuary SPA*, *North Dublin Bay SAC* and *North Bull Island SPA* in view of best scientific knowledge and the conservation objectives of the site(s).

Natura 2000 Sites are those identified as sites of European Community importance designated as Special Areas of Conservation under the Habitats Directive or as Special Protection Areas under the Birds Directive.

1.1 Legislative Context

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as "*The Habitats Directive*", provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000. These are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/ECC) as codified by Directive 2009/147/EC.

Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect Natura 2000 sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment (AA):

> *Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.*

Article 6(4) states:

> *If, in spite of a negative assessment of the implications for the [Natura 2000] site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, Member States shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.*

2 METHODOLOGY

2.1 Guidance Followed

Both EU and national guidance exists in relation to Member States fulfilling their requirements under the EU Habitats Directive, with particular reference to Article 6(3) and 6(4) of that Directive. The methodology followed in relation to this AA has had regard to the following guidance:

- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. Department of Environment, Heritage and Local Government, (DoEHLG, 2010).
- Circular L8/08 – Water Services Investment and Rural Water Programmes – Protection of Natural Heritage and National Monuments. Department of Environment, Heritage and Local Government, (DoCHG, 2008).
- Communication from the Commission on the Precautionary Principle. Office for Official Publications of the European Communities, Luxembourg, (EC, 2000a).
- Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg, (EC, 2000b).
- Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC. Office for Official Publications of the European Communities, Brussels (EC, 2001).
- Managing Natura 2000 sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC; Office for Official Publications of the European Communities, Luxembourg, (EC, 2018).
- Guidance document on Article 6(4) of the '*Habitats Directive*' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the Commission. Office for Official Publications of the European Communities, Luxembourg, (EC, 2007).
- Nature and biodiversity cases: Ruling of the European Court of Justice. Office for Official Publications of the European Communities, Luxembourg (EC, 2006).
- European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No.477 of 2011).
- Interpretation Manual of European Union Habitats. Version EUR 28. European Commission (EC, 2013).

2.2 Desktop Assessment Methodologies

This assessment consisted of a desktop review of the existing literature and web-based datasets in relation to the various ecological interests, including National Parks and Wildlife Service, National Biodiversity Data Centre and data from Birdwatch Ireland.

Key sources of information relied upon in this assessment are listed below:

- Plans and specifications for the proposed development
- Qualifying interests / conservation objectives of Natura 2000 sites from www.npws.ie;
- Geological and hydrological maps from the Geological Survey of Ireland webmapping service (www.gsi.ie/mapping.htm), the National Biodiversity Data Centre (http://maps.biodiversityireland.ie/), and the Environmental Protection Agency web viewer (http://gis.epa.ie/EPAMaps/)
- Irish Wetland Bird Survey (IWeBS) data from various subsites in Dublin Bay and the Grand Canal for the 2012 / 2013 to 2015 / 2016 survey seasons, received from Birdwatch Ireland in June 2018
- Natura Impact Report for the Poolbeg West Strategic Development Zone Planning scheme (CAAS Ltd on behalf of Dublin City Council, 2017)
- Natura Impact Statements for the Ringsend Waste Water Treatment Works Extension (Natura Environmental Consultants on behalf of Dublin City Council, 2012)
- Wildfowl Monitoring (Winter 2014 / 15) for the Dublin Waste to Energy Facility (Eleanor Mayes Ecological Consultant, 2015)

2.3 Stages Involved in the Appropriate Assessment Process

Stage 1: Screening / Test of Significance

This process identifies whether the proposed Scheme is directly connected to or necessary for the management of a European Site(s); and identifies whether the proposed project is likely to have significant impacts upon a European Site(s) either alone or in combination with other projects or plans.

The output from this stage is a determination for each European Site(s) of not significant, significant, potentially significant, or uncertain effects. The latter three determinations will cause that site to be brought forward to Stage 2.

Stage 2: Appropriate Assessment

This stage considers the impact of the proposed Scheme on the integrity of a European Site(s), either alone or in combination with other projects or plans, with respect to (1) the site's conservation objectives; and (2) the site's structure and function and its overall

integrity. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts is required.

The output from this stage is a Natura Impact Statement (NIS). If the assessment still determines potential for negative impacts with the inclusion of proposed mitigation measures, *i.e.* adverse effects on the integrity of a site cannot be excluded, then the process must consider alternatives (Stage 3) or proceed to Stage 4.

Stage 3: Assessment of Alternatives

This process examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the European Site. This assessment may be carried out concurrently with Stage 2 to find the most appropriate solution. If no alternatives exist or all alternatives would result in negative impacts to the integrity of the European Sites, then the process either moves to Stage 4 or the project is abandoned.

Stage 4: Assessment Where Adverse Impacts Remain

An assessment of compensatory measures where, in the light of an assessment of Imperative Reasons of Overriding Public Interest (IROPI), it is deemed that the project or plan should proceed.

3 STAGE 1 SCREENING

3.1 Background

Appropriate Assessment is a staged process, the first of which is referred to as Screening. This stage of the process identifies the likely impacts on European sites, if any, which might arise as a result of a proposed development either alone or in combination with other plans and projects, and further considers whether these impacts are likely to adversely affect the integrity of any European sites. If the conclusions at the end of the screening exercise are that significant impacts on any European sites, as a result of the construction and/or operation of the proposed development, either alone or in combination with other plans and projects, are likely, uncertain or unknown, then there is a requirement to proceed to Stage 2 of the Appropriate Assessment process. If, however the conclusions at the end of the screening exercise are that significant impacts on any European sites, as a result of the proposed development, either alone or in combination with other plans and projects, can be confidently ruled out on the basis of objective scientific information, the need for Stage 2 Appropriate Assessment does not arise.

3.2 Proposed Development

District Heating (DH) is a thermal energy network which distributes hot water or steam through insulated dual (supply and return) pipe lines to serve property energy demands. DH systems allow heat energy as distinguished from fuel to be bought and sold as a commodity. It offers advantages in terms of higher energy efficiencies, reduced consumption of energy resources and is fully compatible with European and National climate change policies and objectives for carbon dioxide reduction, energy efficiency, security of energy supply, sustainability and competitiveness.

The DDHS involves the development of a proposed District Heating System to recover and distribute waste heat primarily from the Dublin Waste to Energy (DWtE) Plant at Poolbeg Peninsula which has recently begun operations. A Medium Pressure Hot Water (MPHW) main transmission line from DWtE Plant in Poolbeg will be designed to carry the excess heat production of the DWtE Plant to potential consumers identified in the Docklands Strategic Development Zone and the Poolbeg West Strategic Development Zone. The network will be constructed using pre-insulated DH pipes according to the EN 253 specification (District heating pipes are pre-insulated bonded pipe systems for directly buried hot water networks. The pipe assembly comprise a steel service pipe, polyurethane thermal insulation and outer casing of polyethylene). The design is based on the international standard BE EB 13941: *"Design and installation of pre-insulated bonded pipe systems for district heating*".

3.3 Location of the Proposed Works

The DDHS catchment area is shown in **Figure 3.1**. The Scheme area includes the North Lotts and Grand Canal Dock Strategic Development Zone (commonly called the Docklands SDZ) which is outlined in the dashed red shape to the left of **Figure 3.1**, and the Poolbeg West Strategic Development Zone (PWSDZ), which is outlined in the dashed and dotted red polygon. The area of Poolbeg Peninsula is outlined in blue and has the PWSDZ included within it.

3.4 Timing & Duration of the Proposed works

The Scheme is likely to be developed on a phased basis with the initial network infrastructure development proposed for the following areas:

- Poolbeg area from the DWtE Plant to the PWSDZ,
- Ringsend between the PWSDZ and the southern shaft of the Liffey Tunnel,
- The North Lotts area and
- The Grand Canal Area.

In the future the network may be extended to also include the proposed Trinity College Technology Enterprise Campus and the area north of Sheriff Street and North Lotts.

A construction duration of 24 months has been assumed for the purposes of this assessment which allows for the construction and installation of the District Heating network and Back-Up Boiler/Energy Station.

At the time of writing this Screening Report the programme and timing of works is unknown.

3.5 Details of the Proposed Works

A diagrammatic representation of the proposed DDHS is given in **Figure 3.2** and a brief description of the DDHS infrastructure is provided in the sub-sections below.

Heating System

The DH infrastructure will leave the DWtE Plant *via* an over ground pipeline gantry which will consist of approximately 150 m of overhead pipes. The remainder of the pipelines will be below ground pressurised trunk pipework including all branches and connections to individual buildings. Pipe sizes range from 50 mm dia. internal and 140 mm external to 600 mm dia. internal and 800 mm external. Most of the pipelines will be installed within the public roads, public parks and industrial lands.

There are three watercourse crossings included in the proposed scheme, one of which has already been completed. The River Liffey Crossing has been installed within the River Liffey Services Tunnel and connects Poolbeg Peninsula to the North Lotts Strategic Development Zone (SDZ). The other River crossings are across the River Dodder and the Grand Canal waterway. These crossings are to facilitate the developments located within the Grand Canal SDZ (**Figure 3.3**). It is proposed that both the Canal Basin and Dodder River crossings are constructed by trenchless technology. The proposed pipe size for the Canal Basin is twin DN 400 pipes while the proposed Dodder crossing consists of DN125 pipework these pipe sizes lend themselves to construction *via* micro tunnelling..

Barriers will be set up to demark the working zones; in particular, for excavation works. The carriageways; where present, will be sawcut, break out of surfaces will be completed with an excavator with a breaker attachment and excavated to the required depth to accommodate a pipeline at 750 mm minimum cover. Localised reductions or increases in pipeline depth may be required to minimise impact on existing utilities. The excavated material will be removed to an appropriate permitted/licenced waste facility. All excavated material will be loaded directly on to an awaiting vehicle and be removed off site as above. In some instances (where the waste facility is closed due to works hours) the excavated material may need to be stored overnight. The material will be transported to temporary construction compounds.

There will be a requirement for storage compounds/temporary construction compounds along the DDHS route. These will consist of existing hard standing areas and will not require works to accommodate the storage of the DH pipes. The compound sites will store pipe, pipe fittings and will accommodate the offsite prefabrication for the welds to each pipe. It is proposed that the fill material will be delivered directly to site; however, there may be a need to store fill material at the compound sites. Plant and machinery will be housed overnight at these sites and at the construction location if sufficient space is available. Upon completion of the proposed works, the compounds will be restored to their original state.

In terms of pipe testing only potable water will be used. Pipes are to be filled slowly in consultation with DCC/Irish Water to minimise the impact on the water network. Water used for the DDHS pipe testing will be released to the foul sewer network in a controlled manor.

Energy Station – Back-up boiler and Storage Tank

A peak-load/reserve boiler will be provided to ensure consistency of supply during periods of maintenance at the DWtE Plant. Under normal operation the reserve boiler is expected to be required for a period of three weeks twice a year.

The boiler house will be to the south of the DWtE Plant within the PW SDZ. There will be a flue approx. 30 m in height and 2.5 m in diameter and it is anticipated that the boiler will have an ultimate capacity of approx. 40 MW with a capacity of approximately 16 MW required initially. Plan dimensions of the boiler structure are expected to be 40 m x 20 m, with 2.5 m clear space surrounding.

Leakage/Damage Detection System

To ensure that the DDHS operates at a high efficiency level it is proposed to include a leakage detection system along all pipework to protect against leaks and damage. The DDHS will be monitored by a leak test alarm wire which is cast in to the pipeline insulation and monitored remotely.

3.6 Details of Previously Constructed Works

Existing planning policy within both the '*North Lotts and Grand Canal Dock Strategic Development Zone'* and '*Poolbeg West Strategic Development Zone'* requires that all proposed developments be '*District Heating Enabled'*. To connect to the DDHS, a development will be required to have installed:

- DH pipework within the street, connecting from the main transmission line to each heat exchanger. The sizing of the pipework will depend on the site's location in proximity to the heat sources on the DH Network and the heat load of the development.
- Heat exchangers to serve each building, or a group of buildings spaced close together.
- Consumer installations, including pipework, valves, apartment units and domestic hot water system, heat meters, radiators, under floor heating etc.

Several existing developments, particularly in the North Docklands/Spencer Dock area, have already included provisions for future connection to the DDHS. For future developments proposed connection details will be included for within individual planning applications as appropriate.

Depending on the size of individual developments to be served by the DDHS internal water treatment facility/pressure holding/pumping equipment may be required. These will be detailed on the individual planning applications for developments as required.

The following is a list of DH infrastructure that has been installed in advance of the DDHS, this infrastructure will be utilised as part of the scheme:

- Liffey Services Tunnel: This is approximately 300 m from point to point. The internal dimensions of the supply and return pipes are 508 mm (internal), while the external diameters are 710 mm for the flow pipe and 630 mm for the return pipe.

- New "*north south road*": Installation of approximately 280 m and 200 mm internal diameter and smaller in the new "*north south road*" alongside the 3Arena.
- Mayor Street: Approximately 248 m of DH pipe was installed under Mayor Street, as follows;
    - DH Pipe installation of various sizes up to 400 mm *dia*. ID laid in Mayor Street Upper, Park Lane (or Spencer Street as noted in some documents).
    - DH pipes under the Luas crossing of Mayor Street and a new proposed street which is provisionally named Spencer Avenue.
- New Wapping Street: Twin 600 mm pipe sleeves were installed under the LUAS for District Heating on the east side of the junction.
- Castleforbes: Space was left for future installation of DH pipes under the Luas crossing.

Figure 3.1: Location Plan of DDHS Area

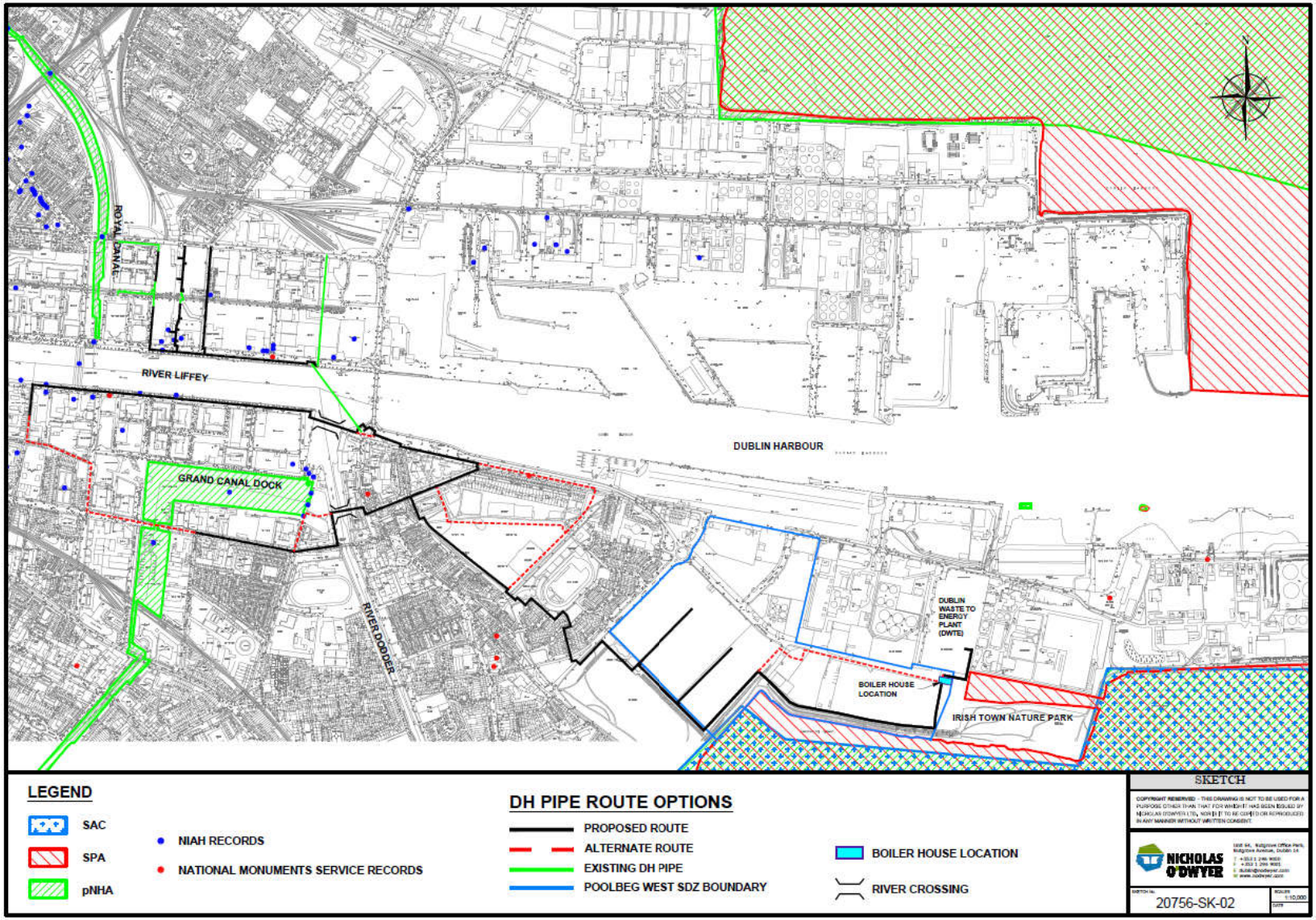


Figure 3.2: Proposed Works

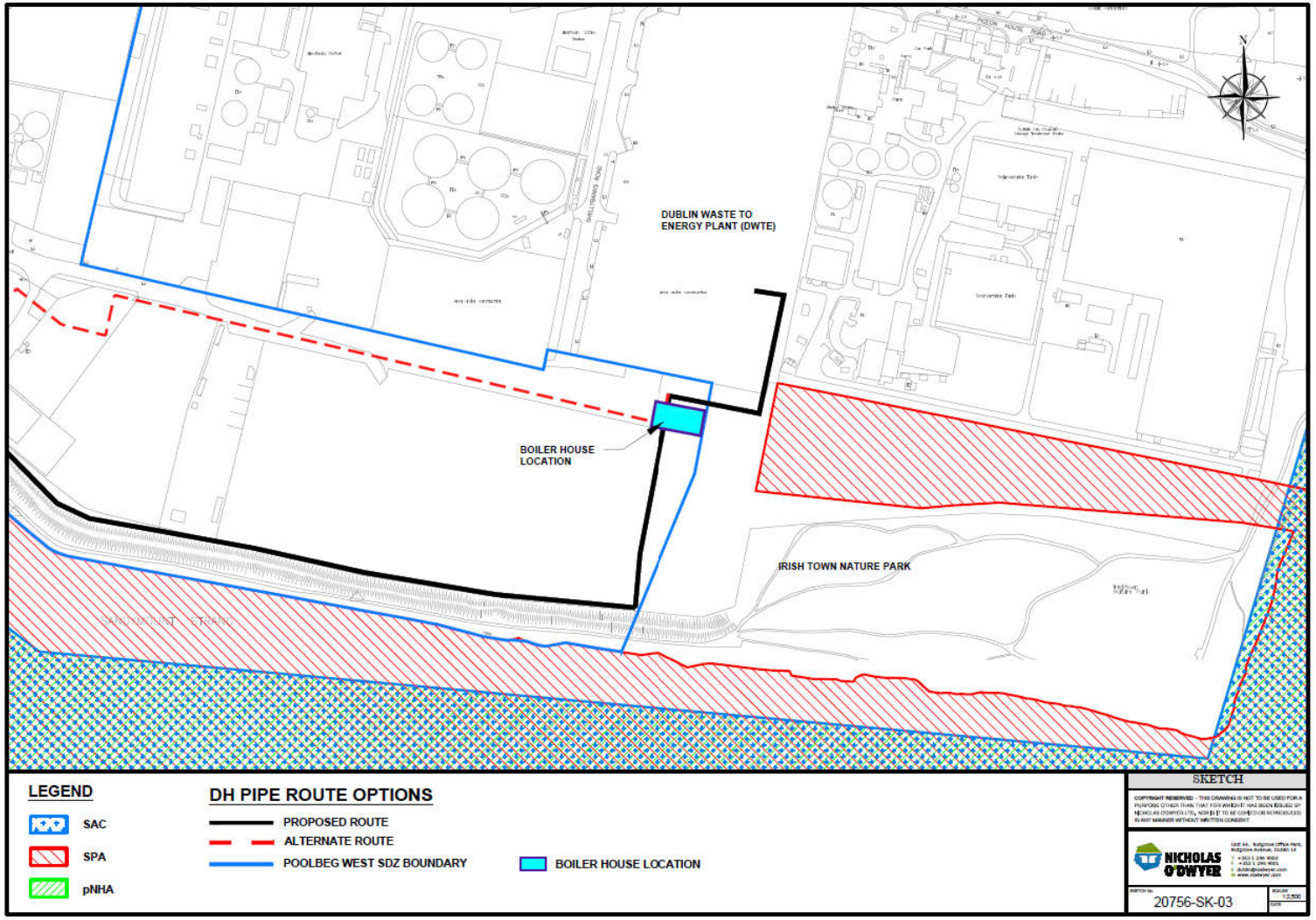


Figure 3.3: Energy Station – Site Location

3.7 Description of Receiving Environment

The proposed area is contained within Dublin City and occupies areas of the docklands, Poolbeg West and Poolbeg Peninsula. The main activity of the Port area is freight handling. The area consists mostly of industrial and commercial lands, but there are some recreational areas, including Irishtown Nature Park and Sean Moore Park, within the vicinity of the proposed works.

There are several waterbodies proximate to the proposed works, which are estuaries near their outlets. These rivers are highly modified within the Dublin City area, weirs, culverts and man-made banks are present along most of their course within the city. These rivers converge around Dublin Port and the proposed scheme area.

Heating System

The elements relating to the DDHS pipework are mostly below ground structures, excluding the exit pipework at the DWtE Plant and the Energy Station. The pipework construction will be within roads and footpaths only, some works will be within industrial lands and some recreation/amenity areas.

Energy Station – Back-up boiler and Storage Tank

The energy Station is contained within the SDZ boundary, Poolbeg Peninsula (**Figure 3.3** and **3.4**). The lands area is currently used to house freight materials and is within an area of hardstanding/bare ground. The site is approximately 70 m from Irishtown Nature Park, 30 m from *South Dublin Bay and River Tolka Estuary SPA* and 150 m from *South Dublin Bay SAC.*

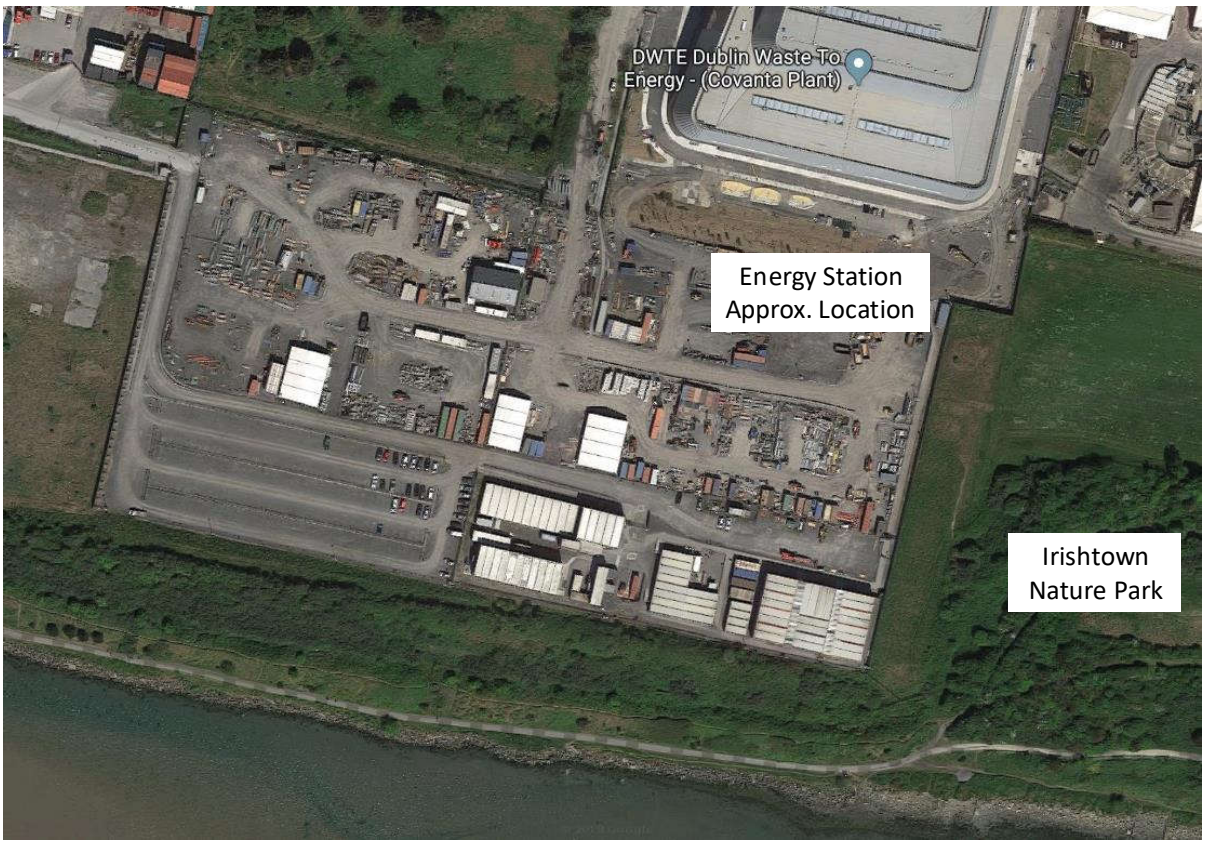


Figure 3.4: Energy station location and current land use (Source: Google Maps)

4 NATURA 2000 SITES

4.1 Identification of Relevant Natura 2000 Sites

This section of the screening process describes the Natura 2000 sites within the potential impact zone of the proposed development. A 15 km buffer zone from the extremities of the development envelope has been chosen, along with identifying any other receptor pathways (*i.e.* rivers, streams or ecological corridors) as a precautionary measure, to ensure that all potentially affected Natura 2000 sites are included in the screening process. This is in line with Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities produced by the Department of the Culture, Heritage and the Gaeltacht.

Figure 4.1 shows the location of all Natura 2000 sites within the 15 km zone of impact and those connected to the proposed development *via* receptor pathways. **Table 4.1** lists the Natura 2000 sites within this zone of impact, the Qualifying Interests of each of the identified Natura 2000 Sites and determines the potential for significant *source-pathway-receptor* links existing between the proposed development and the European sites. Those sites or individual Qualifying Interests that are screened out at this stage (primarily as a result of being too great a distance away and having different habitat requirements) are not assessed any further in this Screening report.

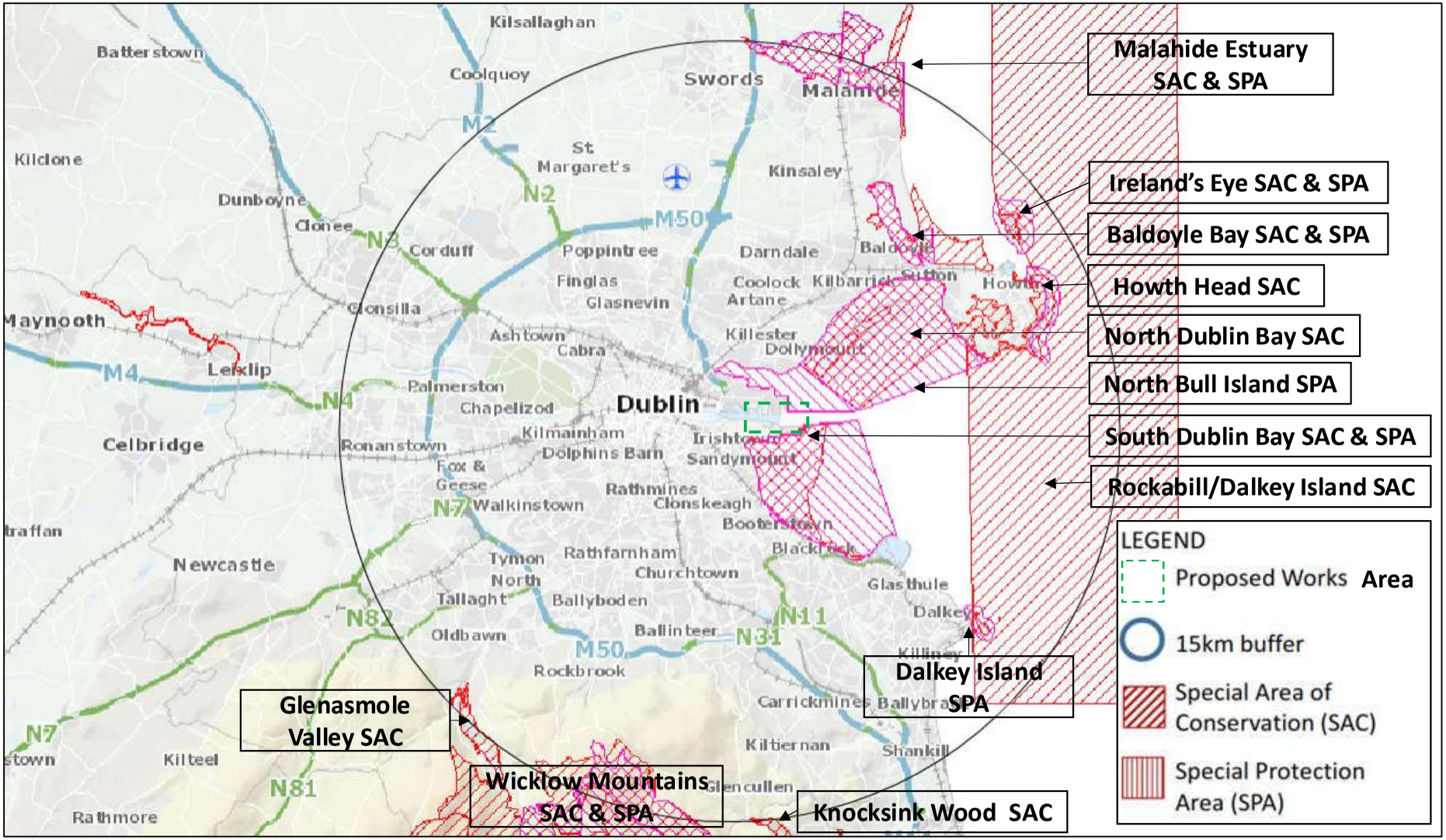


Figure 4.1: Natura 2000 Sites within 15 km of the Proposed Works

Table 4.1: Natura Sites located within the Zone of Impact of the Proposed Development

Site Code & Name (*ca.* distance)	Qualifying Interest	Do any potential *source-pathway-receptor* links exist between the proposed development and the European site?	To be Assessed Further in Screening?
(000210) South Dublin Bay SAC (0 km)	• Mudflats and sandflats not covered by seawater at low tide [1140] • Annual vegetation of drift lines [1210] • Salicornia and other annuals colonising mud and sand [1310] • Embryonic shifting dunes [2110]	The proposed development will not be within the SAC, so there is no risk of direct impacts. Pollutants generated during the construction of the proposed development could pass through hydrological pathways (either surface water or groundwater) into the SAC, where they could affect mudflats / sandflats or other Annex I habitats. Vibration generated during the construction of the proposed development pass through a range of pathways (ground, air or water) to affect sediment dynamics in nearby mudflats / sandflats.	**Yes**
(004024) South Dublin Bay and River Tolka Estuary SPA (0 km)	• Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] • Oystercatcher (*Haematopus ostralegus*) [A130] • Ringed Plover (*Charadrius hiaticula*) [A137] • Grey Plover (*Pluvialis squatarola*) [A141] • Knot (*Calidris canutus*) [A143] • Sanderling (*Calidris alba*) [A144] • Dunlin (*Calidris alpina*) [A149] • Bar-tailed Godwit (*Limosa lapponica*) [A157] • Redshank (*Tringa totanus*) [A162] • Black-headed Gull (*Chroicocephalus ridibundus*) [A179] • Roseate Tern (*Sterna dougallii*) [A192] • Common Tern (*Sterna hirundo*) [A193]	The proposed development will not be within the SPA, so there is no risk of direct impacts. Pollutants generated during the construction of the proposed development could pass through hydrological pathways (either surface water or groundwater) into the SPA, where they could affect overwintering waterfowl. Noise, vibration and human activity could cause the disturbance of overwintering waterfowl and breeding / staging / passage populations of terns.	**Yes**

Site Code & Name (*ca*. distance)	Qualifying Interest	Do any potential *source-pathway-receptor* links exist between the proposed development and the European site?	To be Assessed Further in Screening?
	• Arctic Tern (*Sterna paradisaea*) [A194] • Wetland and Waterbirds [A999]		
(000206) North Dublin Bay SAC (2.5 km)	• Mudflats and sandflats not covered by seawater at low tide [1140] • Annual vegetation of drift lines [1210] • Salicornia and other annuals colonising mud and sand [1310] • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] • Mediterranean salt meadows (*Juncetalia maritimi*) [1410] • Embryonic shifting dunes [2110] • Shifting dunes along the shoreline with *Ammophila* arenaria (white dunes) [2120] • Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] • Humid dune slacks [2190] • *Petalophyllum ralfsii* (Petalwort) [1395]	The proposed development will not be within the SAC, so there is no risk of direct impacts. Indirect effects could occur *via* the source-pathway-receptor links listed for the *South Dublin Bay SAC*, although due to the distances involved, the risk and magnitude of impacts would be much lower than described above.	**Yes**
(004006) North Bull Island SPA (2.5 km)	• Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] • Shelduck (*Tadorna tadorna*) [A048] • Teal (*Anas crecca*) [A052] • Pintail (*Anas acuta*) [A054] • Shoveler (*Anas clypeata*) [A056] • Oystercatcher (*Haematopus ostralegus*) [A130] • Golden Plover (*Pluvialis apricaria*) [A140]	The proposed development will not be within the SPA, so there is no risk of direct impacts. Indirect effects could occur *via* the source-pathway-receptor links listed for the *South Dublin Bay and River Tolka Estuary SPA*, although due to the distances involved, the risk and magnitude of impacts would be much lower than described above. It is noted that many birds move freely between the SPAs in Dublin Bay.	**Yes**

Site Code & Name (*ca*. distance)	Qualifying Interest	Do any potential *source-pathway-receptor* links exist between the proposed development and the European site?	To be Assessed Further in Screening?
	• Grey Plover (*Pluvialis squatarola*) [A141] • Knot (*Calidris canutus*) [A143] • Sanderling (*Calidris alba*) [A144] • Dunlin (*Calidris alpina*) [A149] • Black-tailed Godwit (*Limosa limosa*) [A156] • Bar-tailed Godwit (*Limosa lapponica*) [A157] • Curlew (*Numenius arquata*) [A160] • Redshank (*Tringa totanus*) [A162] • Turnstone (*Arenaria interpres*) [A169] • Black-headed Gull (*Chroicocephalus ridibundus*) [A179] • Wetland and Waterbirds [A999]		
(003000) Rockabill to Dalkey Island SAC (7 km)	• Reefs [1170] • *Phocoena phocoena* (Harbour Porpoise) [1351]	As the proposed development will be constructed entirely in terrestrial areas, and will involve relatively small-scale construction works, there is considered to be no risk of impacts on the qualifying interests of this SAC.	**No**
(000202) Howth Head SAC (7.5 km)	• Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] • European dry heaths [4030]	As the proposed development will be constructed entirely in terrestrial areas, and will involve relatively small-scale construction works, there is considered to be no risk of impacts on the qualifying interests of this SAC.	**No**
(000199) Baldoyle Bay SAC (8.5 km)	• Mudflats and sandflats not covered by seawater at low tide [1140] • Salicornia and other annuals colonising mud and sand [1310] • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	As the proposed development will be constructed entirely in terrestrial areas, and will involve relatively small-scale construction works, there is considered to be no risk of impacts on the qualifying interests of this SAC.	**No**

Site Code & Name (*ca*. distance)	Qualifying Interest	Do any potential *source-pathway-receptor* links exist between the proposed development and the European site?	To be Assessed Further in Screening?
	• Mediterranean salt meadows (*Juncetalia maritimi*) [1410]		
(000199) Baldoyle Bay SPA (8.5 km)	• Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] • Shelduck (*Tadorna tadorna*) [A048] • Ringed Plover (*Charadrius hiaticula*) [A137] • Golden Plover (*Pluvialis apricaria*) [A140] • Grey Plover (*Pluvialis squatarola*) [A141] • Bar-tailed Godwit (*Limosa lapponica*) [A157] • Wetland and Waterbirds [A999]	As the proposed development will be constructed entirely in terrestrial areas, and will involve relatively small-scale construction works, there is considered to be no risk of impacts on the special conservation interests of this SPA. It is possible that some birds from this SPA may move between Baldoyle Bay and the coastal waters around Poolbeg, but the impact assessment for the *South Dublin Bay and River Tolka Estuary SPA* will account for any birds that move to the area.	**No**
(004113) Howth Head Coast SPA (9.5 km)	• Kittiwake (*Rissa tridactyla*) [A188]	As the proposed development will be constructed entirely in terrestrial areas, and will involve relatively small-scale construction works, there is considered to be no risk of impacts on the special conservation interests of this SPA.	**No**
(003000) Dalkey Islands SPA (10 km)	• Roseate Tern (*Sterna dougallii*) [A192] • Common Tern (*Sterna hirundo*) [A193] • Arctic Tern (*Sterna paradisaea*) [A194]	It is likely that birds from this SPA will join with other terns in the large post-breeding flocks that form in Dublin Bay in the late-summer / autumn period. However, the impact assessment for the *South Dublin Bay and River Tolka Estuary SPA* will account for any terns that move to the area.	**No**
(002193) Ireland's Eye SAC (11 km)	• Perennial vegetation of stony banks [1220] • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	As the proposed development will be constructed entirely in terrestrial areas, and will involve relatively small-scale construction works, there is considered to be no risk of impacts on the qualifying interests of this SAC.	**No**

Site Code & Name (*ca*. distance)	Qualifying Interest	Do any potential *source-pathway-receptor* links exist between the proposed development and the European site?	To be Assessed Further in Screening?
(004117) Ireland's Eye SPA (11 km)	• Cormorant (*Phalacrocorax carbo*) [A017] • Herring Gull (*Larus argentatus*) [A184] • Kittiwake (*Rissa tridactyla*) [A188] • Guillemot (*Uria aalge*) [A199] • Razorbill (*Alca torda*) [A200]	As the proposed development will be constructed entirely in terrestrial areas, and will involve relatively small-scale construction works, there is considered to be no risk of impacts on the special conservation interests of this SPA.	**No**
(002122) Wicklow Mountains SAC (12 km)	• Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110] • Natural dystrophic lakes and ponds [3160] • Northern Atlantic wet heaths with *Erica tetralix* [4010] • European dry heaths [4030] • Alpine and Boreal heaths [4060] • Calaminarian grasslands of the *Violetalia calaminariae* [6130] • Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] • Blanket bogs (* if active bog) [7130] • Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) [8110] • Calcareous rocky slopes with *chasmophytic* vegetation [8210] • Siliceous rocky slopes with *chasmophytic* vegetation [8220] • Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] • *Lutra lutra* (Otter) [1355]	Due to the considerable distances between the proposed development site and this SAC, there is considered to be no risk of impacts on its qualifying interests.	**No**

Site Code & Name (*ca*. distance)	Qualifying Interest	Do any potential *source-pathway-receptor* links exist between the proposed development and the European site?	To be Assessed Further in Screening?
(004040) Wicklow Mountains SPA (12 km)	• Merlin (*Falco columbarius*) [A098] • Peregrine (*Falco peregrinus*) [A103]	Due to the considerable distances between the proposed development site and this SPA, there is considered to be no risk of impacts on its special conservation interests.	**No**
(000205) Malahide Estuary SAC (12 km)	• Mudflats and sandflats not covered by seawater at low tide [1140] • Salicornia and other annuals colonising mud and sand [1310] • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] • Mediterranean salt meadows (*Juncetalia maritimi*) [1410] • Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] • Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	Due to the considerable distances between the proposed development site and this SAC, there is considered to be no risk of impacts on its qualifying interests.	**No**
(004025) Broadmeadow/Swords Estuary SPA or Malahide Estuary SPA (12.5 km)	• Great Crested Grebe (*Podiceps cristatus*) [A005] • Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] • Shelduck (*Tadorna tadorna*) [A048] • Pintail (*Anas acuta*) [A054] • Goldeneye (*Bucephala clangula*) [A067] • Red-breasted Merganser (*Mergus serrator*) [A069] • Oystercatcher (*Haematopus ostralegus*) [A130] • Golden Plover (*Pluvialis apricaria*) [A140] • Grey Plover (*Pluvialis squatarola*) [A141]	Due to the considerable distances between the proposed development site and this SPA, there is considered to be no risk of impacts on its special conservation interests. It is possible that some birds from this SPA may move between Malahide and the coastal waters around Poolbeg, but the impact assessment for the *South Dublin Bay and River Tolka Estuary SPA* will account for any birds that move to the area.	**No**

Site Code & Name (*ca*. distance)	Qualifying Interest	Do any potential *source-pathway-receptor* links exist between the proposed development and the European site?	To be Assessed Further in Screening?
	• Knot (*Calidris canutus*) [A143] • Dunlin (*Calidris alpina*) [A149] • Black-tailed Godwit (*Limosa limosa*) [A156] • Bar-tailed Godwit (*Limosa lapponica*) [A157] • Redshank (*Tringa totanus*) [A162] • Wetland and Waterbirds [A999]		
(001209) Glenasmole Valley SAC (13.5 km)	• Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210] • Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] • Petrifying springs with tufa formation (*Cratoneurion*) [7220]	Due to the considerable distances between the proposed development site and this SAC, there is considered to be no risk of impacts on its qualifying interests.	**No**
(000725) Knocksink Wood SAC (14 km)	• Petrifying springs with tufa formation (*Cratoneurion*) [7220] • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]	Due to the considerable distances between the proposed development site and this SAC, there is considered to be no risk of impacts on its qualifying interests.	**No**

4.2 Designated Sites of Relevance

Following a review of potential *source-pathway-receptor* links, four Natura 2000 sites were considered to be at risk of potential impacts from the proposed development:

- South Dublin Bay and River Tolka Estuary SPA
- South Dublin Bay SAC
- North Bull Island SPA
- North Dublin Bay SAC

Further information on the qualifying interests of these sites, and their conservation objectives, conservation status and threats, are provided below.

4.2.1 Qualifying interests of SACs

The *South Dublin Bay SAC* is adjacent to the proposed development site, and therefore is of greatest relevance for the impact assessment. The SAC has four qualifying interests: mudflats / sandflats, annual vegetation of drift lines, *Salicornia* and other annuals colonising mud and sand, and embryonic shifting dunes. Sandflats are the most extensive habitat in the SAC, covering all intertidal areas in the south of Dublin Bay, with some localised patches of mudflat at the outflows of rivers, notably the Elm Park Stream at Booterstown. There are small patches of drift line and embryonic dune vegetation beside Sean Moore Park, around Poolbeg Power Station, and near Booterstown. A small patch of embryonic *Salicornia* salt marsh is also located at Booterstown.

The *North Dublin Bay SAC* has similar areas of sandflat, and more highly-developed mudflat, saltmarsh and dune habitats, particularly around Bull Island. The SAC also supports some dune slack habitats and the Annex II species petalwort *Petalophyllum ralfsii*. However, as the latter features are exclusively terrestrial and are located more than 2.5 km from the proposed development site, they are not considered to be at risk.

Overall, the only qualifying interest of the SACs that is considered to be at risk of potential impacts from the proposed development is sandflat habitat. The conservation objective for this habitat within the SAC is outlined below, along with some information on its current conservation status in Ireland.

Conservation objectives

Sandflat (and to a lesser extent mudflat) is widespread in the SAC and is also the habitat of greatest importance to the bird species that inhabit the SPAs. The following conservation objective applies to both sites:

"To maintain the favourable conservation condition of mudflats and sandflats not covered by seawater at low tide in the *South Dublin Bay SAC, which is defined by the following list of attributes and targets:*

- *The permanent habitat area is stable or increasing, subject to natural processes*
- *Maintain the extent of the Zostera-dominated community, subject to natural processes*
- *Conserve the high quality of the Zostera-dominated community, subject to natural processes*
- *Conserve the following community type in a natural condition: fine sands with Angulus tenuis community complex"*

Conservation status

Inter-tidal mudflats / sandflats are currently considered to be of 'unfavourable / inadequate' conservation status in Ireland due to long-term problems with water quality (NPWS 2013), but the trend appears to be improving. The main threats to their conservation status are:

- **High importance:** pollution of surface waters (limnic & terrestrial, marine & brackish)
- **Low importance:** fishing and harvesting aquatic resources, bottom culture, hand collection, estuarine and coastal dredging, nautical sports and other outdoor sports and leisure activities

4.2.2 Special Conservation Interests of the SPAs

The *South Dublin Bay and River Tolka Estuary SPA* is a large site that covers the following features: sandflat / mudflat habitat to the south of the River Liffey, the Tolka Estuary to the north of Dublin Port, Booterstown Marsh, a man-made mooring structure in the Dublin docks (which is used by breeding terns), and a small patch of grassland to the south of the Ringsend Waste Water Treatment Works. The site has been designated to protect a range of overwintering birds (notably Light-bellied Brent Geese), breeding terns, and staging / passage populations of terns.

At low tide the overwintering birds spread across the extensive sandflats and mudflats to feed on invertebrates in the sediment, and at high tide many of the birds roost in open areas along the coast. Many of the birds move freely between the *South Dublin Bay and River Tolka Estuary SPA*, the *North Bull Island SPA* and other coastal SPAs in the Dublin region. Brent Geese also fly inland to feed on amenity grasslands in parks and sports fields around Dublin city; these areas are not included within the SPAs, but are important supporting habitat features for this species.

Further information on the conservation objectives of the two SPAs in Dublin Bay are outlined below, along with the conservation status of their key species. Key areas for birds within the zone of influence of the proposed development are also discussed in **Section 4.2.3**.

Conservation objectives: wetland habitat

This objective applies to all intertidal habitats within each SPA, which have a total area of 2,192 ha in the *South Dublin Bay and River Tolka Estuary SPA* and 1,713 ha in the *North Bull Island SPA*.

> *"To maintain the favourable conservation condition of the wetland habitat in the SPA as a resource for the regularly occurring migratory waterbirds that utilise it. This is defined by the following attribute and target: the permanent area occupied by the wetland habitat should be stable and not significantly less than the [existing area of each site], other than that occurring from natural patterns of variation".*

Conservation objectives: overwintering birds

This objective applies to overwintering species that use the SPAs: light-bellied Brent geese, shelduck, teal, pintail, ringed plover, grey plover, shoveler, oystercatcher, golden plover, knot, sanderling, dunlin, black-tailed godwit, bar-tailed godwit, curlew, redshank, turnstone and black-headed gull. Most of these species are winter migrants, which spend the non-breeding / winter season (usually between October and April) in Ireland / western Europe and migrate to Arctic / sub-Arctic regions during the breeding season. Some species are present year-round, but the populations of all species are highest during the winter.

At low tide waterfowl (*e.g*. Brent Geese) feed on green algae and eel-grasses, and waders feed on sediment-dwelling macro-invertebrates, primarily within the intertidal sandflat and mudflat habitats. At high tide most species roost on the water's edge or fly inland to roosting / feeding sites.

The conservation objective for these species is:

> *"To maintain the favourable conservation condition of* [overwintering waterfowl]*, which is defined by the following list of attributes and targets:*
>
> - *Long term population trend stable or increasing*
> - *No significant decrease in the range, timing or intensity of use of areas by light-bellied Brent goose, other than that occurring from natural patterns of variation"*

Of the eighteen overwintering species, for which the sites were designated, four (shoveller, grey plover, golden plover and black-headed gull) have a long-term declining population trend of between 25.0 and 49.9% at this site and are considered to be of unfavourable conservation status, while two species (shelduck and pintail) have long-term declines of between 1 and 24.9% and are considered to be of intermediate unfavourable conservation status at this site. These species are also of unfavourable status at a national level (Lynas *et al.* 2009). The remaining twelve species (including Brent Geese) have stable or increasing populations.

Conservation objectives: breeding tern species

The common tern *Sterna hirundo* and Arctic Tern *Sterna paradisaea* breed annually in the Dublin Docks on a man-made mooring structure known as the E.S.B. dolphin, which is also included within the *South Dublin Bay and River Tolka Estuary SPA*. Although only the common tern is listed as a breeding species for this SPA, the following conservation objective is assumed to any breeding terns in the SPA:

"To maintain the favourable conservation condition of [tern species] *in the South Dublin Bay and River Tolka Estuary SPA, which is defined by the following list of attributes and targets:*

- *No significant decline in:*
  - *Breeding population abundance: apparently occupied nests*
  - *Productivity rate: fledged young per breeding pair*
  - *Distribution: breeding colonies*
- *Disturbance at breeding site: human activities should occur at levels that do not adversely affect the breeding common tern population"*

Conservation objectives: passage migrants

The common tern, Arctic Tern and roseate tern *Sterna dougallii* are listed as passage migrants in the *South Dublin Bay and River Tolka Estuary SPA*, as the site is used as a staging point by significant numbers of birds before their autumn migration. The following conservation objective applies is assumed to apply to these and any other terns in the SPA:

"To maintain the favourable conservation condition of [tern species] *in the South Dublin Bay and River Tolka Estuary SPA, which is defined by the following list of attributes and targets:*

- *No significant decline in:*
  - *Passage population: individuals*
  - *Distribution: roosting areas*
  - *Prey biomass available*

- *No significant increase in barriers to connectivity*
- *Disturbance at roosting site: human activities should occur at levels that do not adversely affect the post-breeding aggregation of* [tern species]"

Key threats to waterfowl

In the *Action plan for shore and lagoon birds in Ireland 2011-2020* (Birdwatch Ireland 2011), the following threats are listed for coastal birds:

- Recreation and disturbance
- Habitat loss, degradation and fragmentation
- Coastal developments
- Pollution and oil spills
- Climate change
- Alien invasive species and predation
- Mineral and resource use
- A general lack of awareness of the importance of nature and biodiversity

4.2.3 Key areas for birds within the zone of influence

Dublin Bay and the Grand Canal

In order to assess the distribution and abundance of waterfowl in the vicinity of the proposed development site, data from the Irish Wetland Bird Survey (IWeBS) for the 2012 / 2013 to 2015 / 2016 survey seasons was requested from Birdwatch Ireland.

The closest relevant subsite within South Dublin Bay covers the sandflat habitat in a linear strip between Poolbeg and Sydney Parade Avenue. When peak counts were considered for the four years of data, there were internationally-important populations of Brent Geese in two years (a peak of 2,321 in 2012 / 2013, and 706 in 2015 / 2016), and nationally-important populations of four species in at least one year: Oystercatcher, Ringed Plover, Knot, Sanderling and Dunlin. All five of these species are listed as qualifying interests of the SPA.

The Grand Canal is not within any SPAs, and therefore is not subject to Appropriate Assessment, but the IWeBS data was assessed in order to determine whether the canal was used by any of the birds in the nearby SPAs. The closest IWeBS subsites to the proposed development are at Grand Canal Dock and the section of canal between Harold's Cross Road and Pearse Street. The canal supports some common urban waterfowl such as Mute Swan, Mallard and Moorhen, but none were recorded in significant numbers. None of the special conservation interests of the SPAs were recorded.

Amenity grassland areas at Poolbeg and Ringsend

As noted above, Brent Geese frequently fly inland to feed on amenity grasslands in parks and sports fields around Dublin city. There are a number of suitable grassland areas within the vicinity of the proposed development, including a patch of '*compensatory grassland'* adjacent to the Ringsend WWTP (this was created specifically as a habitat for geese), as well as the playing fields and rough grassland in Sean Moore Park, the Irishtown Stadium and Ringsend Park.

One of the IWeBS subsites is labelled as '*Poolbeg (inland)*', which covers a number of these sites. When peak counts were considered for the four years of available data, there were internationally-important populations of Brent Geese in two years (a peak of 520 in 2012 / 2013, and 787 in 2015 / 2016), and nationally-important populations of two species in 2013 / 2014 (20 Red-breasted Merganser and 250 Sanderling). Therefore, although these grassland areas are outside the boundary of the SPA, they still support internationally-important numbers of Brent Geese, so they are clearly an important habitat for this species in Dublin Bay.

Populations of Brent Geese in the grassland areas around Poolbeg and Ringsend were also surveyed annually between 2007 / 2008 and 2014 / 2015 as part of the post-construction monitoring programme for the DWtE Plant. Extracts from a report by Eleanor Mayes Ecological Consultant in 2015 are included below.

Between 2007 / 2008 and 2014 / 2015 there were peak counts of up to 411 Brent Geese at the compensatory grassland beside Ringsend WWTP, 950 at Sean Moore Park East, 600 at Sean Moore Park West, 450 at Irishtown Stadium and 680 at Ringsend Park. All of these counts would qualify as internationally-important. It is noted that these are peak counts, and thus are higher than the average counts that would be observed on most days at these locations. Nonetheless, the peak counts indicate that all of these grassland areas can provide habitat for significant numbers of Brent Geese.

Breeding and staging areas for terns

A man-made mooring structure known as the E.S.B. dolphin within Dublin Port was colonised by breeding terns at some time in the 1980s, and it now supports in excess of 400 breeding pairs of Common Tern, and a small number of Arctic Terns. The structure is one of the most-important breeding sites for Common Tern in Ireland, and is now managed exclusively for the conservation of this species. Terns typically nest between March and July, inclusive. The structure is located approximately 800 m to the north-east of the proposed development site, and is separated by the DWtE Plant and the Ringsend WWTP.

It is located in a busy part of Dublin Port, but the terns appear to have become habituated to the noise and visual disturbance in the area.

After the breeding season, many terns from the Dublin area aggregate in large flocks in the south of Dublin Bay prior to their migration to the southern hemisphere, typically between late July and September. A large number of terns from other parts of Northern Europe also pass through Dublin Bay as part of their migration in September / October. This can account for very large numbers of birds, with up to 2,000 Roseate Terns, 5,000 Common Terns, and 20,000 Arctic Terns.

Summary

The proposed development site is adjacent to two Natura 2000 sites (the *South Dublin Bay SAC* and the *South Dublin Bay and River Tolka* Estuary SPA) and is located < 3 km from two very similar sites (the *North Dublin Bay SAC* and the *North Bull Island SPA*).

The primary qualifying interest of the adjacent SAC is sandflat / mudflat habitat, which extends to the south and east of the Poolbeg peninsula. The proposed Boiler House/Energy Station and part of the Medium Pressure Hot Water (MPHW) main transmission line will be within 200 m of the SAC boundary.

The primary interest of the adjacent SPA is Light-bellied Brent Geese (and to a lesser extent some other waterfowl species), which are present in significant numbers in the sandflat habitat to the south and east of the Poolbeg peninsula. Brent Geese also fly inland to feed on amenity grasslands at the Ringsend WWTP, Sean Moore Park, Irishtown Stadium and Ringsend Park. Although these grassland areas are outside the boundary of the SPAs, they are considered key habitats for the local Brent Goose population. It should be noted that Brent Geese and other waterfowl within the SPAs are winter visitors to Ireland, and are typically present between October and April (inclusive), and absent between May and September.

The SPA is also important for nesting terns between March and July, although their activity is highly localised within Dublin Port. Between July and September, large numbers of terns use Dublin Bay as a staging / passage site prior to their migration.

5 LIKELIHOOD OF POTENTIAL IMPACTS ON NATURA 2000 SITES

The likelihood of significant impacts on the Qualifying Interests of the Natura 2000 sites identified in this report is based on information collated from the desk study and other available existing information.

The purpose of this section of the screening assessment is to examine the likelihood that the proposed works (construction and operational phases), either individually or in combination with other plans and projects, may result in significant effects on the *South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, North Dublin Bay SAC,* and the *North Bull Island SPA*, and specifically, the Qualifying Interests with potential *source-pathway-receptor* links to the proposed development (as concluded in **Section 4**).

5.1 Construction Impacts

Likelihood of significant impacts from the direct loss of terrestrial habitat area within the SAC / SPA

The proposed development site is not located within any of the Natura 2000 sites (refer to **Figures 3.2** and **3.3),** so there is no risk of habitat loss, fragmentation or any other direct impacts.

Likelihood of water quality impacts

The proposed development will involve a range of construction activities, including: the clearance of parts of the site, the construction of a Boiler House/Energy Station and a short section of overhead pipeline gantry, the excavation of trenches, crossings of the River Dodder and Grand Canal waterways by trenchless technology, and the re-instatement of the site. These activities have potential to generate pollutants, including:

- Suspended silt or other sediments, which can reduce water quality, harm aquatic fauna, and/or alter the flow of watercourses
- Concrete and cement, which are composed of highly alkaline, corrosive fine sediments that are very harmful to birds and aquatic fauna
- Hydrocarbons (oil, petrol, diesel, *etc.*), solvents and other chemicals, which are toxic to birds and aquatic fauna

If any of these pollutants reached coastal waters, the River Dodder, the Grand Canal or the River Liffey, they could be carried downstream into the SACs and SPAs in Dublin Bay. Based on the above, and without the implementation of pollution control measures, there is a risk of likely significant effects on the water dependent qualifying interests of the SACs or SPAs.

Likelihood of Disturbance Impacts to Birds from Noise and Visual Disturbance

There have been a number of significant construction projects on the Poolbeg peninsula in the last five years, the construction of the DWtE Plant, the demolition and clearance of the former Irish Glass Bottle site, and a range of other, small-scale developments. It is also located adjacent to Dublin Port, which involves regular movement of ships and loading / unloading of cargo. Therefore, there is a level of background disturbance in the area to which many coastal bird species would have become partially habituated. Nonetheless, possible disturbance impacts on birds within the SPA are considered below.

In winter months, Brent Geese are present in numbers of international importance both within and around the proposed development site. This includes the extensive areas of sandflat to the south and east of the Poolbeg peninsula, but also the *'compensatory grassland'* to the south of the Ringsend WWTP (which is adjacent to the location of the proposed boiler house), as well as Sean Moore Park, the Irishtown Stadium and Ringsend Park (which are along the proposed route of the main transmission lines). Some other waterfowl species are also present in numbers of national importance on the sandflat to the south and east of the Poolbeg peninsula.

At this stage the timing of works is unknown. Given the importance of the surrounding area for overwintering birds, the likelihood of significant disturbance effects from the construction of the proposed development on the Brent Geese or any other overwintering waterfowl in the SPAs in Dublin Bay cannot be excluded at this stage of the Appropriate Assessment process.

The SPA is also an important breeding site for Common Terns in the spring / early summer period. However, all nesting takes place on a small man-made mooring structure within Dublin Port, located approx. 800 m from the proposed development site, and separated by tall buildings and industrial lands. The nesting terns in this location have become habituated to the high levels of noise and visual disturbance within Dublin Port, and therefore are not considered to be sensitive to noise and visual disturbance during the construction of the proposed development.

Several thousand terns also use the southern section of Dublin Bay as a staging / passage site in late summer and autumn. However, any terns using Dublin Bay at this time would become habituated to the high levels of noise and visual disturbance associated with recreational activity in the area. They have high mobility during the staging / passage period (in contrast to nesting periods), and therefore would be able to move around the bay ensuring no likelihood for temporary, localised disturbance proximate to the proposed

development site. As a result, noise and visual disturbance generated by construction works would not cause any significant impacts on these species.

Likelihood of Disturbance Impacts to Habitats from Vibration

In the Natura Impact Report for the PWSDZ Planning Scheme (CAAS Ltd. on behalf of Dublin City Council, 2017), vibration arising from construction works was identified as a potential threat to the *South Dublin Bay SAC,* as follows: "*The habitat features within the SAC are sensitive to vibrations and alteration to sediment dynamics.*" It is acknowledged that sand-based habitats such as sandflats, drift lines and embryonic dunes are highly-dynamic habitats, which may be disturbed by vibration, particularly if it is of high intensity or long duration.

However, the only construction work within 100 m of the *South Dublin Bay SAC* boundary will be the installation of the main transmission lines. This will involve the excavation of a trench, laying of a pipeline of up to 800 mm external diameter, and the reinstatement of the site. This will all take place within soft sediment (sandy soils and/or loam) and will not involve any rock breaking or other high-intensity work. Therefore, it is not expected that the proposed development will cause any high-intensity or prolonged vibration proximate to the SAC, so there will be no impacts on its qualifying interests.

5.2 Operational Impacts

Direct impacts

There will be no modification of the Natura 2000 sites during the operation of the proposed development, so there is no risk of direct impacts.

Indirect impacts

The proposed Boiler/Energy Station will produce very little noise during its operation, so there will be no significant increase in baseline noise levels in the surrounding area. All other aspects of the development will be underground, so they will not generate any noise.

Access to the site will be required for routine servicing, inspection and maintenance activities, typically by small good vehicles and small numbers of staff. However, there is a high level of human activity in the adjacent port, WWTP and DWtE Plant, and the proposed development will not cause a significant increase in human activity above baseline levels.

Therefore, the operation of the proposed development will not cause noise or any other form of disturbance that could affect birds within the SPA.

5.3 Cumulative and in Combination Impacts

As there is some potential for adverse impacts of the proposed development on the Conservation Objectives of *South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, North Dublin Bay SAC,* and the *North Bull Island SPA*, there is also the possibility that there could be in-combination impacts of this proposed development with other plans or projects that are completed and others which are approved but uncompleted. Such impacts will need to be examined in a Natura Impact Statement.

6 SCREENING CONCLUSIONS

Article 42 (7) of the European Communities (Birds and Natural Habitats) Regulations 2011 states that: "*The public authority shall determine that an Appropriate Assessment of a plan or project is not required […] if it can be excluded on the basis of objective scientific information following screening under this Regulation, that the plan or project, individually or in combination with other plans or projects, will have a significant effect on a European site.*"

The potential impacts of the proposed DDHS have been examined in the context of several factors that could potentially affect the integrity of the Natura 2000 network, including habitat loss, fragmentation, pollution of waterbodies, and disturbance of fauna.

Based on the assessment it cannot be excluded beyond reasonable scientific doubt, in view of best scientific knowledge on the basis of objective information and in light of the conservation objectives of the relevant European sites, that the proposed development, individually or in combination with other plans and projects, would have a significant effect on the *South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, North Dublin Bay SAC,* and the *North Bull Island SPA*.

As a result, it is recommended to the competent authority that an Appropriate Assessment is required and that a Natura Impact Statement be prepared in respect of the proposed development

7 REFERENCES

CAAS Ltd, 2017. Natura Impact Report for the Poolbeg West Strategic Development Zone Planning scheme. Prepared as part of a planning application for the SDZ, available online.

DoCHG. (2009). Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (Revised February 2010). Department of the Environment, Heritage and Local Government.

DoCHG (2008). Circular L8/08 Water Services Investment and Rural Water Programmes – Protection of Natural Heritage and National Monuments. Department of the Environment, Heritage and Local Government.

Eleanor Mayes Ecological Consultant, 2015. Wildfowl Monitoring Report (Winter 2014 / 15) for the Dublin Waste to Energy Facility. Prepared as planning compliance for the development, available online.

European Commission. (2000). Managing Natura 2000 Sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC. Office for Official Publications of the European Communities, Luxembourg.

European Commission (2018) Managing Natura 2000 Sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC. Office for Official Publications of the European Communities, Luxembourg.

European Commission. (2002)). Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC. Office for Official Publications of the European Communities, Luxembourg.

European Commission. (2007). EU Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC. Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the Commission.

European Commission (2000b). Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg.

European Commission (2001). Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC. Office for Official Publications of the European Communities, Brussels.

European Commission, (2007a). Interpretation Manual of European Union Habitats [Online] Available at: http://ec.europa.eu/environment/nature/legislation /habitatsdirective/docs/2007_07_im.pdf

Natura Environmental Consultants, 2012. Natura Impact Statements for the Ringsend Waste Water Treatment Works Extension. Prepared as part of a planning application for the development, available online.

NPWS (2013). The Status of EU Protected Habitats and Species in Ireland. Species Assessments Volume 3, Version 1.0. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

NPWS (2013). The Status of Protected EU Habitats and Species in Ireland. Overview Volume 1. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Editor: Deirdre Lynn

APPENDIX 6
INITIAL PLANNING OVERVIEW

APPENDIX 7
EXISTING REPORTS REVIEWED

Project Reports

- Dublin District Heating Seminar Report 21st May 2014.pdf
- Dublin District Heating Project Overview Report 2016, prepared by RPS COWI.pdf
- Dublin District Heating Company, Draft Strategic Business Plan, Durango Browne.pdf
- Dublin City Spatial Energy Demand Analysis Codema June 2015.pdf
- Dublin City DH System, Analysis of Heating Demand in Docklands Codema.pdf
- District Heating for Dublin Feasibility Study, RPS & COWI 2008.pdf
- Developing DH in Ireland Conference 4th October 2016.pdf
- DDHS Workshop Proceedings Report 7th July 2017.pdf
- DDHS Promotional brochure.pdf
- DDHS Market Research Report (Draft Oct 2017).pdf
- DDHS Detailed Financial Appraisal Report, Codema, July 17.pdf

Project Overview Reports 2016

- R1 Feasibility Study_Final Version.pdf
- R2 MDE0128Rp0013 - 2007 Feasibility Study.pdf
- R3 MDE0128Rp0023D02.doc
- R4 TST District Heating Survey TR vl.0.pdf
- R5 MDE0128Rp0021_B02 LST Tender Issue Technical Conditions.pdf
- R6 MDE0128Rp0014A01 SD Ph1Technical Specifications.pdf
- R7 MDE0128Rp0019_F0i SD Ph2 Tender Issue Technical Specification.pdf
- R8 MDE0128Rp0024A01 DH Spencer Dock Ph3 Technical Specification.pdf
- R9.1 MDE0128Rp0018_F01 ESCO Part 1 Introductory Information.pdf
- R9.2 MDE0128Rp0018_F01 ESCO Part 2 Pre Qual Questionnaire.pdf
- R9.3 MDE0128Rp0018_F01 ESCO Part 3 Clarification Document 1.pdf
- R9.4 MDE0128Rp0018_F01 ESCO Part 4 Clarification Document 2.pdf
- R9.5 MDE0128Rp0018_F01 ESCO Part 5 Shortlisting Criteria.pdf
- R9.6 MDE0128Rp0018_F01 ESCO Part 6 Shortlisting - Qual Eval.pdf
- R9.7 MDE0128Rp0018_D01 ESCO Part 7 Request for Tenders.pdf
- R10 MDE0128Rp0022_F01.pdf
- R11 MDE0128Rp0012_D03 DH Feasibility Study November 2006.pdf