Appendix 4.10
Feasibility Assessment - District Heating

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Feasibility Assessment

Herbata Data Centre Campus - District Heating Network

Naas, County Kildare
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1 Executive Summary

HDR has undertaken a high-level feasibility assessment on behalf of Herbata Ltd to assess the opportunities for harnessing the waste heat associated with the proposed Herbata data centre campus facility in Jigginstown, Co. Kildare. The study looks at the potential uses for ideally between 5 and 20 MW of medium to high grade waste heat recovered from the exhaust stacks from two of the gas turbines used to power the data centres. The study includes reviewing both existing and proposed local facilities that could be used and to provide a high-level heat demand map and delivery model.

From a policy perspective, a lead has been taken from The District Heating Steering Group that was formed under the Climate Action Plan 2021, as part of the Irish Government's commitment to further the expansion of district heating in the State. The Steering Group coordinates the rollout of policies and measures to support district heating in Ireland and reports annually to the Government on steps taken to ensure district heating is developed in a structured way, including outlining actions taken to support the expansion of district heating, applying appropriate legislation basis, and interpretation of EU Directives. The Steering Group makes evidence-based recommendations to the Department of the Environment, Climate and Communications on targets for district heating. Four key areas of work have been identified:

- Regulation
- Finance
- Planning and Regulations
- Research

Further policy definition is provided cognizant of legislative changes that are likely to be required to support the rollout of District Heating in Ireland, in addition to the regulatory requirements of EU legislation (Renewable Energy Directive 2018/2001/EU and Energy Efficiency Directive 2018/2002/EU). There is important information and support from SEAI, references to their documents are included in the reference section of this report.

There is no doubt that heat networks will need to form part of Ireland's response to its net-zero 2050 target and the utilisation of waste heat will significantly help with the heating decarbonisation challenge. This study concludes that a waste heat load of 20MW (or smaller) provides a number of significant opportunities to decarbonise the heating of public buildings, businesses, new homes in the local area close to the site. A heat load output of 20 MW would be of significance to County Kildare and further opportunities should be explored to designate the surrounding areas as candidates for additional local heat networks. It is expected that the data centre will be developed with a phased approach, and therefore the heat load may be smaller than 20MW initially; the actual phasing and development is to be determined.

It is currently difficult to determine the scope and size of this potential use of the heat, so is not included in this report, but further studies could be undertaken.

In the *Table 1-1* below (as *Table 6-7*), it is shown that a single turbine's heat output could be used at an average rate of around 33%, however there would be variations between summer and winter, it is estimated that the peak could be as much as 60% dependent upon the amount of stored heat that is provided local to the heat load (thermal stores).

Table 1-1. Single turbine's heat output

Section	Description	Heat Demand (GWh/year)	Average Annual Load (kW)	Percentage of Annual Load (less 15% for losses)	
				10MW	20MW
6.2	Existing Facilities	5.62	642	7.55%	3.77%
6.3	Business Areas	14.11	1611	18.95%	9.48%
6.4	Northwest Quadrant	4.88	557	6.55%	3.28%
Totals		**24.61**	**2,810**	**33.06%**	**16.53%**

In order to provide heat to these heat loads, extensive flow and return pipework will be required to be laid throughout the west of Naas, it is estimated that the total length of pipework could be as much as 10km and would need roads and paved areas to be used for trenching. All of this will be subject to further studies and more detailed proposals.

Part of the next set of studies will be to look at the overall viability of the scheme, for this a heat network operator should be involved to provide their view on the scheme. As an example, if they were to sell all the heat noted in the table above as medium-grade heat, 24GWh per year, at a rate of say 4c/kWh (a typical value for medium-grade heat), the heat network operator would likely be able to generate over €1 million per year of revenue. As a rough order of magnitude, the cost to provide the district heating network would exceed €20 million, so a long term (30 to 40 year typically) assessment would be needed to show that the scheme offers potential benefits to a heat network operator their heat load customers.

This assessment therefore makes the following recommendations in terms of next steps:

- Promote discussions with owners of existing facilities to discuss the potential for connecting to the proposed district heating network.
- Discuss with business park owners and operators as to how they may be able to connect into a district heating network.
- Discuss with KCC the development plans for the Northwest Quadrant to develop a more detailed heat mapping.
- Reassess the heat loads for the various facilities, areas, and development to provide a more accurate assessment.
- Consider if any other facilities or buildings that could be connected into the network. This may also include agricultural facilities such as heated greenhouses and vertical farming.
- Consider the phasing of the delivery of the district heat network, review if the phasing is appropriate to the loads and available properties.

- Review the impact of installing district heating trenches, consider if any of the routes could use soft areas rather than roads or pathways.
- Consider the impact on local traffic during the installation, consider potential mitigations, review options with KCC.
- Engage district heating operators to understand potential interest in being involved in the district heating network, review feedback, amend proposals as required.
- Re-calculate the heat load capacities and provide an assessment of the amount of saved carbon and report to KCC.
- Engage specialist engineering installers for cost and schedule assessments for each phase of the district heating system. Review potential revenues & economic benefits.
- KCC are a key stakeholder in actively delivering district heating.

2 Introduction

HDR has been commissioned by Herbata Ltd to undertake a high-level feasibility assessment for the development of a district heating scheme using waste heat from the some of the gas turbines that will support and provided power to a new data centre facility proposed Herbata Data Centre Campus. This report has been developed in response to comments and requests made at a pre-planning meeting with Kildare County Council (KCC) who wish to see how the waste heat could be used in a meaningful way in the Naas and Jigginstown area with either existing or proposed facilities and buildings. Herbata are already committed to providing the waste heat to a connection point on the site, however it is the identification of potential heat uses that is equally important; this report address this issue.

Within this report, there is a description of the facilities to be included on the data centre campus, in particular the plant that will be producing the heat. It should be noted that it is intended to use primarily gas-based turbines to produce the electricity for the data centre buildings rather than use electricity from the grid, which is currently highly constrained. By adding thermal boilers to a selected number of the gas turbine flues can provide high quality heat for use in a district heating system. Use of the waste heat from the data centre halls within the buildings themselves is not deemed viable as the temperature of the heat is typically only around 35 degrees C and so can't easily be used or transported directly.

Having identified where the heat may be generated, the next stage of this report is to identify potential uses. Heat maps of the local area are generated to identify the likely highest uses of heat both at peak and annually, these are also reviewed against potential development areas as identified by KCC.

In addition to the development areas already identified by KCC, there is always the option to use the heat for new uses, particularly for agriculture. There are many examples in locations such as The Netherlands, Iceland, and the Middle East where the heat has been exported to provide for warmed greenhouses for crops and flower growing and also for aquaponics and hydroponics where nutrient-rich specialist water is fed to the roots of plants; this is also known as vertical farming. Establishing a facility nearby for this form of agriculture would mean land remained for agriculture and also used the heat generated on the Herbata site. It is currently difficult to determine the scope and size of this potential use of the heat, but further studies could be undertaken.

Once all the potential uses are identified, then the highest uses are considered in slightly more detail, rules of thumb are used to assess the likely annual energy use and compared to the expected energy production from the gas turbines. Consideration is also given to heat storage, maintenance requirements and potential pipework routing.

The final part of this report provides recommendations on likely viability, next steps and approach going forward.

3 Proposed Data Centre Project

3.1 Site Location

The site is located approximately 2.5 km to the west from Naas town centre in County Kildare, 33 kilometers to the west of Dublin and 20km from Kildare Town. The travel time from Dublin's city centre takes an estimated 45min and from Dublin Airport approximately 40-45 minutes. The site address is Jigginstown, Naas, Co Kildare, Ireland (Lat. 53°13'07'' N / Long. 6°42'00'' W) and is shown in ***Error! Reference source not found.*** below.

Figure 3-1. Site Location

The site is 'green field' and has a gentle slope from North to South. The entire site measures 37.5ha (92.9 Acres). The Northern site boundary measures approximately 730m and runs along the regional R409 road which provides access to the site. This road starts in Naas and travels northwest to end at the intersection with the R403 road. There is a small farmland located at the north-east part of the site in the triangle formed between M7 motorway and R409. The boundary between the site in question and small triangle site is formed by a line of scattered trees. Western site boundary measures approximately 380m and it is formed by a line of trees and hedges.

To the East the site is facing the M7 Motorway with a line of trees and hedges located along the boundary. This site boundary measures approximately 630m. Since 1st December 2021 this site is zoned in the Naas Local Area Plan 2021-2027 for specific

use as a Data Centre P (1). The Proposed Development the subject lands are approximately 37.5ha in extent and are located on the western side of the M7 motorway, positioned between Junctions 9a and 10. The site is bound to the north by the R409 road which provides a direct link to the centre of Naas, approximately 2.5km to the east.

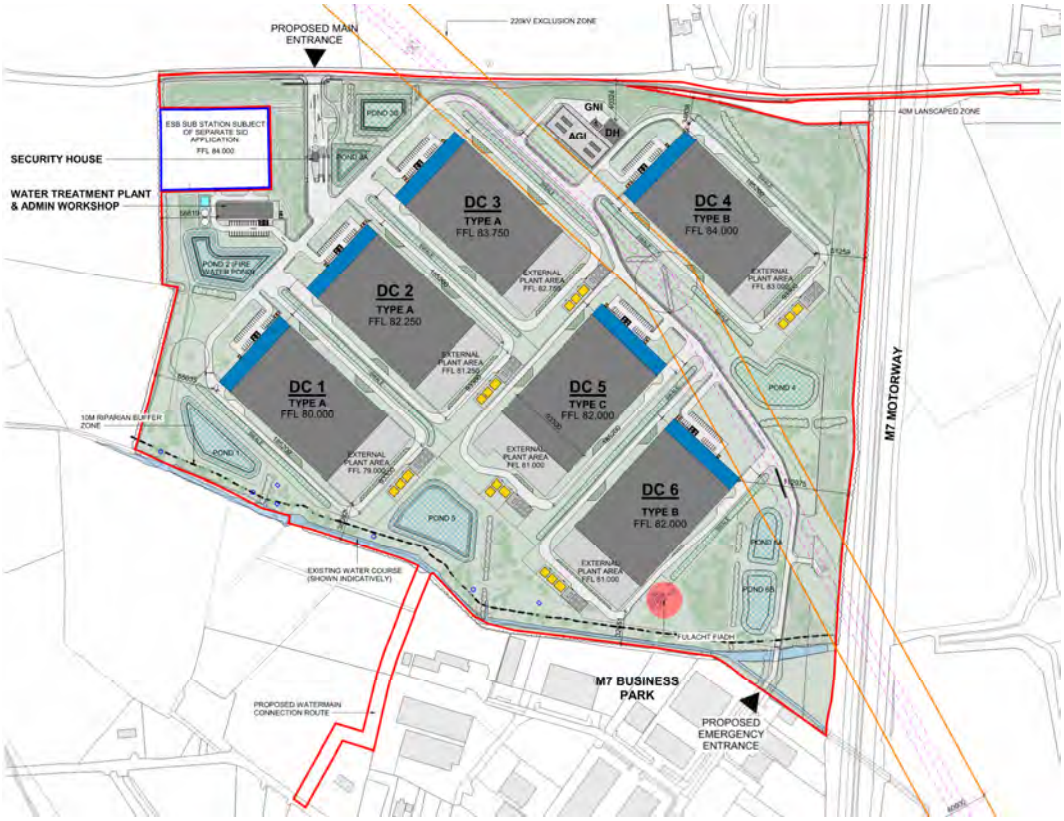
The lands are located between the existing 'M7 Business Park' and 'Osberstown Business Park'. The Osberstown Wastewater Treatment Plant is located nearby to the north. The site is bounded to the east by the M7 motorway and to the west by agricultural lands. The 'Newhall Retail Park' is located to the south of the site, on the east side of the M7 motorway. There has been significant development in the locality in recent years, particularly light industry, logistics and services.

The site is currently in agricultural use and comprises a number of fields which are bounded by hedgerows. There is a cluster of farm buildings located within the site, accessed from the R209. The site falls at a generally even grade from north to south.

3.2 Proposed Site Development

The campus will have six independent two-storey data centres each with a 30MW ICT capacity. The buildings will have their own secure boundaries encompassing the main building, (ancillary facilities, data halls, power generation, fuel storage, etc.), together with dedicated parking. This is shown in ***Error! Reference source not found.*** below, the proposed concept masterplan.

Figure 3-2. Proposed Concept Masterplan



The site will consist of a secure boundary with security for the entire site including a transportation lock and rejection facility.

Ancillary buildings on site will include those dealing with gas and electrical connections for the campus together with workshops and facilities for campus personnel.

3.3 Electrical and Heat Systems Infrastructure

The proposed data centre will have its primary source of power generation on-site. Generation of electricity is proposed on site using highly efficient gas turbines for the majority of the generation, with top up from gas engines. This is in line with recent EU and Irish Government direction on the use of gas for generation as a transition fuel. It also avoids any negative impact from the Proposed Development on the public electricity distribution system and allows for excess power to be exported to the grid to aid Eirgrid in their supply of electricity. The onsite power generation capacity will be in excess of that required for the operation of the data centre and will provide an opportunity for the export of energy to the grid if and when required.

The turbines and engines will be provided with a high-pressure gas supply from Gas Networks Ireland to provide the primary energy supply to each building. The running of the turbines and engines will be continuous with the quantity of units operating at any one time dependent on the load demand in the data halls and the resilience required.

Two of the gas turbines are proposed to have waste heat thermal boilers installed within their exhaust flues to recover the medium to high grade heat from the turbines. Each turbine as a nominal electrical output rating of 5MWe, the available maximum heat output is assumed at 10MWth per turbine, with a total capacity of 20MWth possible when both turbines are available and running. Both turbines will be prioritised in terms of running whenever possible.

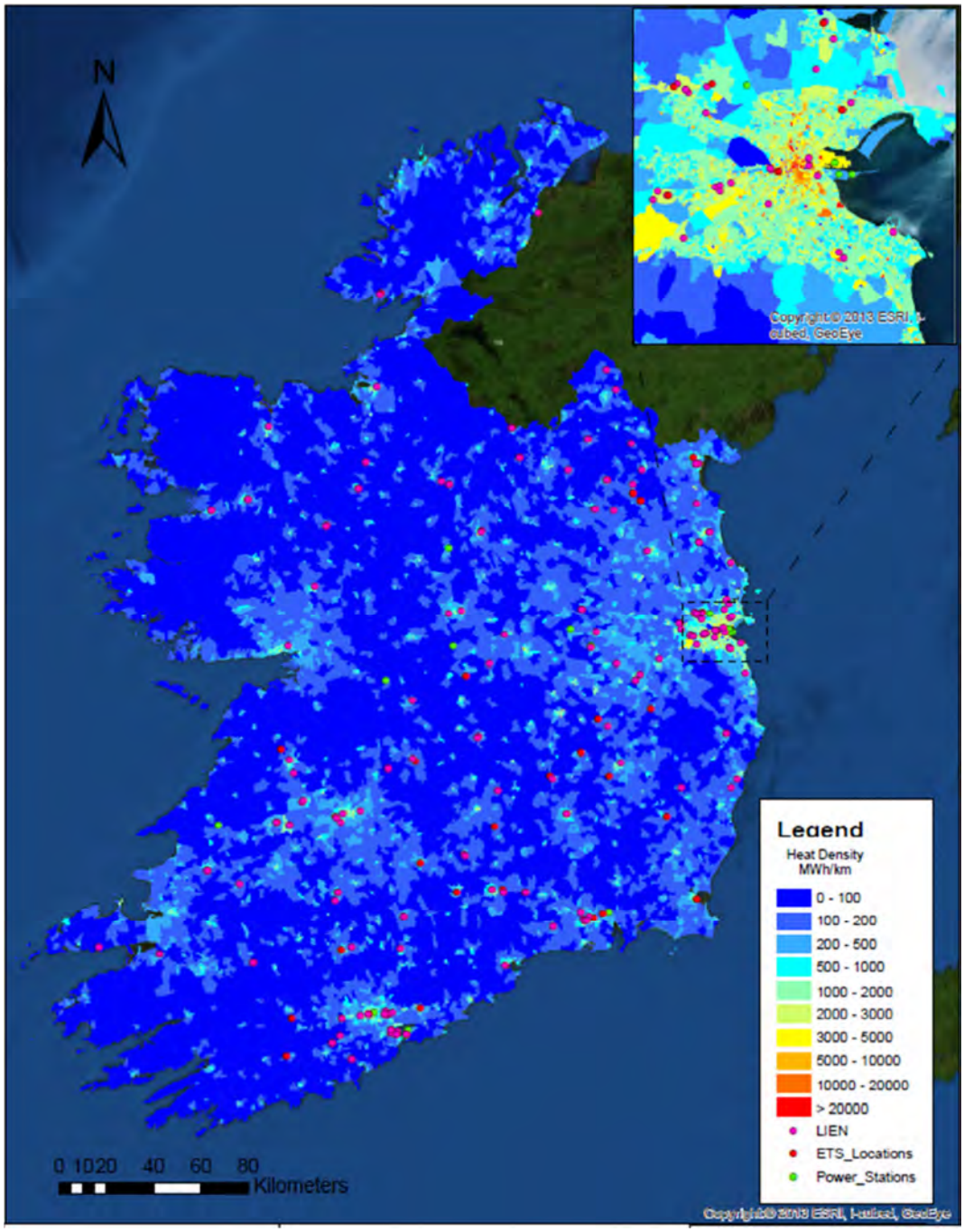
The heat from the thermal boilers will then be pumped via heat exchangers to the perimeter of the data centre campus, to enable district heating pipework to be connected to the identified uses.

For the purpose of this study, it is assumed that the average electrical load of the site associated with ICT (information and communications technology) and cooling, when fully operational, is likely to max out at 220MW, however typically data centres don't achieve 100% utilisation of the power, more normally they max out at 70-80% so in this case with all phases completed an annual power demand from the onsite generation of around 140MW. It is acknowledged that this load is unlikely to be present on the first operational day, with a phased approach being employed by the data centre developer, this will have to be considered in any detailed district heating assessment.

4 Heat Mapping

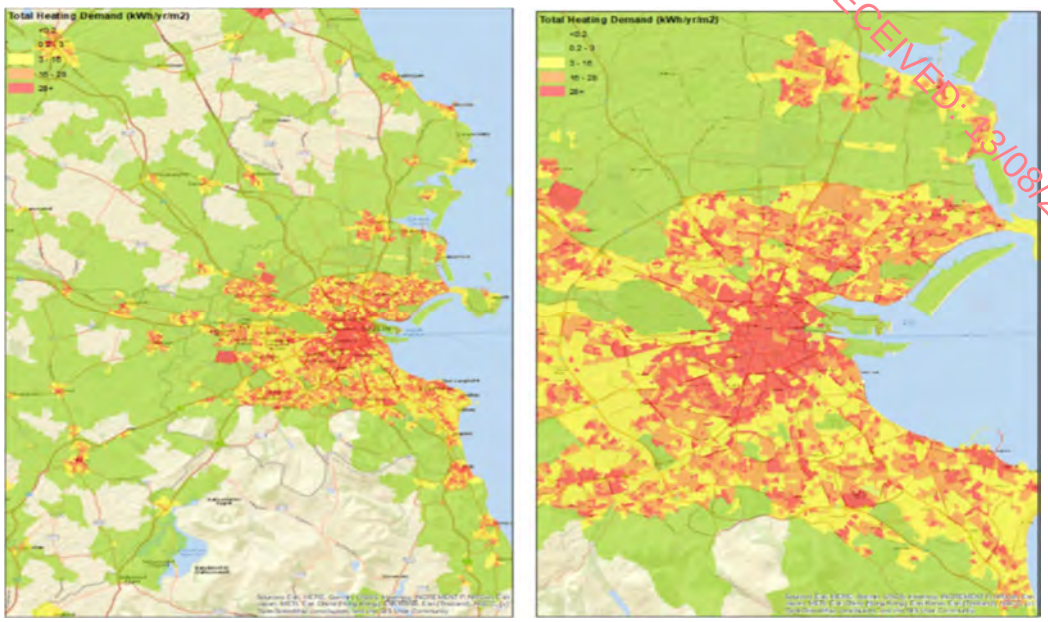
There have been several exercises at heat mapping parts and the whole of Ireland. Examples are given in the references cited at the end of this report. Examples are given in *Figure 4-1* and *Figure 4-2* below.

Figure 4-1. Total 2025 Forecast Linear Heat Density



(Source: SEAI report 2015)

Figure 4-2. Total Heat Demand Sample



(Source: SEAI National Heat Study 2021)

These studies provide excellent information for the introduction to heat mapping but require more detailed local studies to enable proposals and recommendations to be made in particular areas and regions. Whilst this is understood, it is important to carry out the local study, in this case around Naas and the KCC region.

One other aspect to consider is the types of facility or building and their energy use. SEAI provide this information as guidance in their National Heat Study. It should be noted that by far the highest heat demand in Ireland is residential, see *Figure 4-3* below, but there are very large numbers of residential units to connect to make this worthwhile. Instead, it is worth considering much higher densities of heating demand, these are illustrated in *Figure **4-4*** below.

Figure 4-3. Total Annual Heating Demand by Type

(Source: SEAI National Heat Study 2021)

Figure 4-4. Total Annual Heating Demand by Facility Type (Non-Domestic)

(Source: SEAI National Heat Study 2021)

5 Methodology

The methodology for identifying realistic uses of the available heat is outlined below:

1. Identify the available heat from the data centre campus (see above)
2. Review existing facilities and buildings that are likely to require good quantities of heat, these would include the following:
    a. Hotels
    b. Leisure facilities
    c. Swimming pools
    d. Industrial and warehousing
    e. Other public facilities
3. Review plans and development policies for future development areas and their facility / building types.
4. Assess the facilities/building in 2, 3 and 4 above and consider the following:
    a. Size of facility or area for development
    b. Nature of usage
    c. Rules of thumb for heat usage for each (using CIBSE published data)
5. Identify the locations of each of the potential facilities/buildings.
6. Once all the potential facilities/buildings have been identified and assessed, produce a table of the highest annual usage of heat requirement and compare to the available heat.
7. Identify the largest users of heat and how a district heating pipework route may be achieved.

Using the above methodology, it should be possible to match the available heat with the heat usages.

6 Heat Map Opportunities

6.1 Heat Mapping

An area around and towards the centre of Naas has been chosen as the most likely to have opportunities to have heat demands either existing or in future developments. This area is shown in *Figure **6-1*** below.

Figure 6-1. Local Site Area Towards Naas

(Source: Google Maps)

As identified in the previous section, methodology, the intention is to identify potential heat usage for existing facilities, recent schemes with planning permission and future development plans. Those of a significant size and interest are plotted onto the maps in Figures 6-2, and 6-3 below and then combined into Figure 6-4 as the overall opportunities for connecting to heat usages.

6.2 Potential Heat for Existing Facilities

A review of nearby existing facilities has been considered each of a reasonable size and ideally with a constant load. As previously noted, residential schemes have been ignored as they are difficult to retrofit and usually have a very low heat load for 4 – 6 months of the year.

Three key facilities have been identified as follows and as shown in *Figure **6-2*** below:

1. K Leisure Complex
2. Osprey Hotel Complex
3. Kildare Country Council offices

Figure 6-2. Existing Heat Usage Facilities

(Source: Google Maps)

These three facilities have been selected based on their annual usage, size, and proximity to the proposed Herbata Data Centre campus. An assessment of each site is shown in *Table 6-1*.

Table 6-1. Heat Map Assessment

Facility	Heat Demand (GWh/year)	Average Annual Load (kW)	Percentage of Annual Load	
			10MW	20MW
1	2.72	311	3.11%	1.55%
2	1.32	151	1.51%	0.76%
3	1.58	180	1.80%	0.90%
Totals	**5.62**	**642**	**6.42%**	**3.21%**

In reviewing the information in *Table 6-1* above, several assumptions are made:

a) percentage of annual average load assumes a constant load which is unlikely during summer and winter months, this is only provided for comparison purposes.
b) The existing facilities are assumed to be heated currently using gas or electricity and have internal water-based heat distribution to radiators and air handling units or similar.
c) Each facility would need to have a local heat exchanger added to couple into the existing heating system.
d) No allowance has been made for losses, typically 15% would be lost in the distribution of heat (see later assessment)

As can be seen from *Table 6-1*, the heat demand by these existing facilities would be small in comparison to the total available capacity from the turbine heat sources.

6.3 Sites for Future Development

Naas has several sites in the area for light industrial and commercial development. These are centre in specific clusters often with some development already established. This provides the opportunity to provide heat to existing and new facilities in each of these clusters.

The clusters that have been identified that are close to the proposed Herbata Data Centre campus are listed below and in and as shown in *Figure **6-3*** below:

1. The M7 Business Park
2. Osberstown Business Park, and
3. Millennium Park (part of Northwest Quadrant)
4. Northwest Quadrant of Naas (excluding Millennium Park) – this is dealt with separately in Section 6.4

Figure 6-3. Sites For Future Development

(Source: Google Maps)

Table 6-2. Business Areas Development

Area	Business Area	Approx Area (Acres)	Percent built area (%)	Built Area (m^2)	Heat Load per Area (kWh/m^2)	Total Annual Heat Demand (GWh)
1A	The M7 Business Park North (existing)	Not defined	Not defined	22,737	110	2.50
1B	The M7 Business Park South (existing)	20	8	5,120	110	0.56
1C	The M7 Business Park South (new)	7.8	20	4,992	110	0.55
2	Osberstown Business Park	15	20	9,600	110	1.06
3	Millennium Park	227	10	72,640	130	9.44
	Totals	**270**		**92,352**		**11.61**

Using the output above of *Table 6-2*, this can then be taken into the Heat Map Assessment for the Business Areas as shown in *Figure **6-3*** below.

Table 6-3. Business Areas Heat Map Assessment

Area	Heat Demand (GWh/year)	Average Annual Load (kW)	Percentage of Annual Load	
			10MW	20MW
1A	2.50	286	2.86%	1.43%
1B	0.56	64	0.64%	0.32%
1C	0.55	63	0.63%	0.31%
2	1.06	121	1.21%	0.60%
3	9.44	1078	10.78%	5.39%
Totals	**14.11**	**1326**	**16.11%**	**8.06%**

In reviewing the information in *Table 6-3* above, several assumptions are made:

a) percentage of annual average load assumes a constant load which is unlikely during summer and winter months, this is only provided for comparison purposes.
b) Both existing facilities and new facilities are assumed to be heated currently using gas or electricity (direct or with heat pumps) and have internal water-based heat distribution to radiators and air handling units or similar.
c) Each facility would need to have a local heat exchanger added to couple into the existing heating system.
d) No allowance has been made for losses, typically 15% would be lost in the distribution of heat (see later assessment).

6.4 Northwest Quadrant

As noted in Section 6.3 above, Kildare County Council (KCC) have identified the Northwest quadrant as a key area for development adjacent to the centre of Naas. Reference has been made to Naas Town Council's 2007 Masterplan for information on the likely development areas, types of development and opportunities for buildings that will require heat. This is all in the context of the objective of this development is to be as sustainable as possible, to use low carbon technology such as heat pumps and to use Combined Heat and Power (CHP) where possible. Although district heating is not specifically discussed, the use of the heat from the gas turbines would be analogous to CHP albeit with the heat being produced remotely.

Within the above noted Masterplan, the following development areas and types are listed in *Figure **6-4*** below. As can be seen, the majority of the developments are residential (C-1 to C-14 and D-5), as previously noted this form of development is ignored due to low heat demand and high distribution costs. The remaining areas are considered further.

Table 6-4. Individual Zoning Area (Extract Table 5.2)

Objective No.	Specific Zoning Objective	Approx Area (Ha)	Approx. Area (Acres)
C-1	High density residential development including a minimum 10 metre wide tree planted buffer along the eastern side of the site.	1.38	3.4
C-2	To provide for and facilitate medium/higher density residential development.	4	10
C-3	High density residential development.	3.84	9.5
C-4	Medium density residential development to include a mix of house types and sizes.	1.47	3.6
C-7	Medium density residential development.	2.5	6.1
C-8	Medium density residential development.	1.9	4.6
C-9	Medium/High density residential development that must show a detailed relationship to the proposed Canal Harbour LAP in terms of linkages and sustainable forms of transport. Include provision for a nursing home that relates to the Green Belt of the canal.	6.9	17
C-14	Medium density residential development.	2.5 (1.9 Ha developable)	6 (4.6 acres developable)
D-5	Low density residential development to include provision for social and affordable housing.	2.2	5
E1 & E3	Educational Campus & Playing Pitches.	9.2	22
E	Community and Educational	9.97	24.6
E-2	Possible Ecclesiastical/Community Centre site.	9.47	23
H - 2	H2* The Council will encourage the location of Small-Medium Enterprise (SME) related industry in this zone.	1.7	4.2

Taking the information for areas that are non-residential from *Table **6-4*** above, the following assessment of the likely requirements for heat loads are assessed in *Table 6-5* below.

Table 6-5. Heat Map Assessment

Section	Specific Zoning Objective	Approx Area (Acres)	Percent built area (%)	Built Area (m^2)	Heat Load per area (kWh/m^2)	Total Annual Heat Demand (GWh)
6.2	Educational Campus/Playing Pitches	22	8	5,632	150	0.84
6.3	Community & Educational	24.6	20	15,744	110	1.73
E-2	Ecclesiastical / Community Centre	23	20	14,720	120	1.77
H-2	SME industry	4.2	40	5,376	100	0.54
	TOTALS	**74**		**41,472**		**4.88**

Using the output above of *Table 6-5*, this can then be taken into the Heat Map Assessment for the Northwest Quadrant as shown in *Table 6-6* below.

Table 6-6. Northwest Quadrant Heat Map Assessment

Objective No.	Heat Demand (GWh/year)	Average Annual Load (kW)	Percentage of Annual Load	
			10MW	20MW
E1 & E3	0.84	96	0.96%	0.48%
E	1.73	198	1.98%	0.99%
E-2	1.77	202	2.02%	1.01%
H-2	0.54	61	0.61%	0.31%
Totals	**4.88**	**557**	**5.57%**	**2.79%**

In reviewing the information in*Table 6-6* above, several assumptions are made:

a) percentage of annual average load assumes a constant load which is unlikely during summer and winter months, this is only provided for comparison purposes.
b) All new facilities are assumed currently to be based on using air source or ground source heat pumps for heating and have internal water-based heat distribution to radiators and air handling units or similar.
c) Each facility would need to have a local heat exchanger added to couple into the existing heating system.
d) No allowance has been made for losses, typically 15% would be lost in the distribution of heat (see later assessment)

6.5 Overall Heat Map Assessment

In sections 6.2 to 6.4 various opportunities have been assessed in the west of Naas area adjacent to the proposed Herbata data centre campus. Bringing these all together, *Figure **6-4*** identifies the locations by relative heat load sizes (annual basis), *Table 6-7* shows the overall heat demand to give an aggregate loading.

Figure 6-4. Relative Heat Load Sizes

(Source: Google Maps)

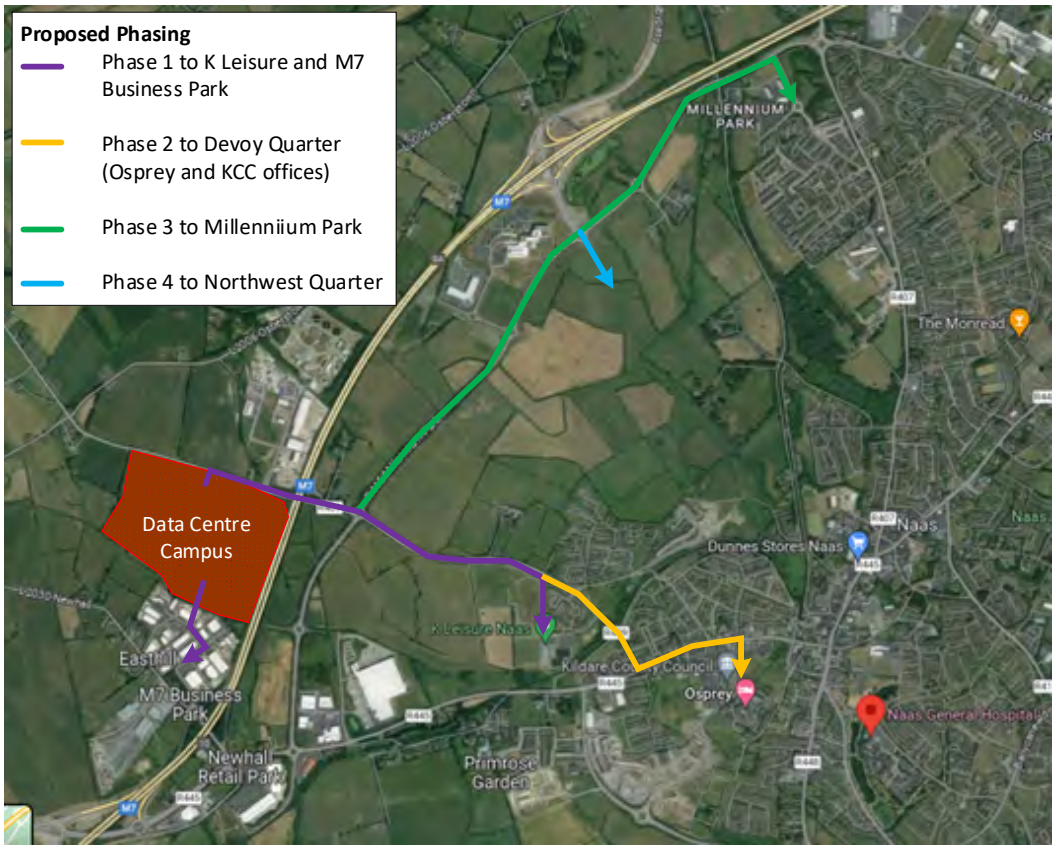
Table 6-7. Overall Heat Map Assessment

Section	Description	Heat Demand (GWh/year)	Average Annual Load (kW)	Percentage of Annual Load (less 15% for losses)	
				10MW	20MW
6.2	Existing Facilities	5.62	642	7.55%	3.77%
6.3	Business Areas	14.11	1611	18.95%	9.48%
6.4	Northwest Quadrant	4.88	557	6.55%	3.28%
Totals		**24.61**	**2,810**	**33.06%**	**16.53%**

Having now analysed the available heat load options and the likelihood of connecting into them, a district heating network can be devised that can be implemented in phases. It is clear that the M7 Business Park and the K Leisure facility offers the most immediate heat loading for the gas turbines and this is proposed as Phase 1, see *Figure **6-5*** below.

They can then be extended further to the Devoy Barracks area where both the Osprey Hotel and KCC offices could be connected. The major load has been identified as the Millennium Park area; this is shown as Phase 3 with a relatively easy extension to the Northwest Quarter as developments come onstream. It is estimated that the total length of the proposed district heating network would be in the order of 10km with flow and return pipework.

Figure 6-5. Proposed District Heating Network Phasing

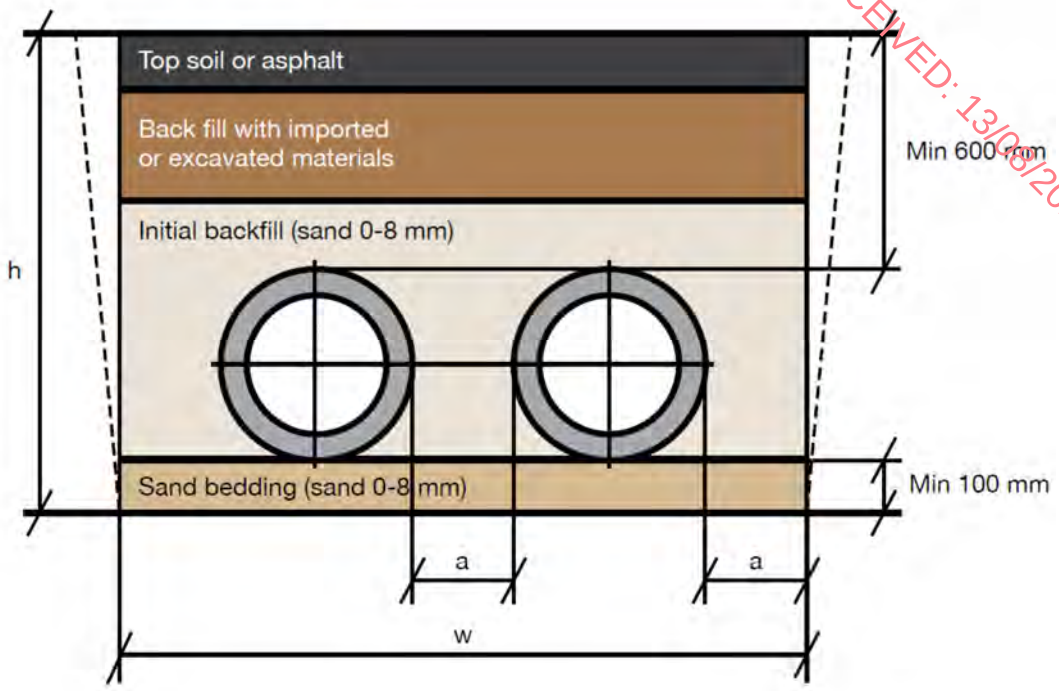


(Source: Google Maps)

It is assumed that with all of the phases for the proposed district heating, that pipework of up to 300mm in diameter plus insulation will need to be installed into trenches of varying widths. An example trench arrangement is shown in *Figure **6-6***, for 300mm flow and return pipework, the trench size would need to be 1.5m wide x 1.2m deep, as the network expands out smaller pipe sizes could be used; for example, a pair of 100mm diameter pipes would only need a trench size of 0.85m wide x 0.9m deep. The impact to roads and pavements would have to be assessed in the implementation phase of the district heating network, this will of course require KCC to take a lead role in the implementation and delivery of the district heating as the project would be a major element of infrastructure works that impacts the public amenities as well as giving energy to a number of facilities, both existing and new.

Typical district heating distribution temperatures are 120° Celsius flow and 90° Celsius return but will vary by operator.

Figure 6-6. Proposed District Heating Network Phasing



(Source: DH Manual for London)

7 Recommendations and Next Steps

This feasibility assessment is the first step towards considering whether heat that can be made available from two of the gas turbines proposed for the Herbata Data Centre campus. This assessment identifies potential locations close to the campus on the west side of Naas together with their potential heat load. It shows that on average that the turbine heat output could be used at around 33% of a single turbine, remembering that the peak level will be much higher than this level depending upon what degree of local heat storage is used (recommended). Providing access to a second turbine gives good resilience for the district heat network.

The following recommendations and next steps are proposed:

- Promote discussions with owners of existing facilities to discuss the potential for connecting to the proposed district heating network.
- Discuss with business park owners and operators as to how they may be able to connect into a district heating network.
- Discuss with KCC the development plans for the Northwest Quadrant to develop a more detailed heat mapping.
- Reassess the heat loads for the various facilities, areas, and development to provide a more accurate assessment.
- Consider if any other facilities or buildings that could be connected into the network. This may also include agricultural facilities such as heated greenhouses and vertical farming.
- Consider the phasing of the delivery of the district heat network, review if the phasing is appropriate to the loads and available properties.
- Review the impact of installing district heating trenches, consider if any of the routes could use soft areas rather than roads or pathways.
- Consider the impact on local traffic during the installation, consider potential mitigations, review options with KCC.
- Engage district heating operators to understand potential interest in being involved in the district heating network, review feedback, amend proposals as required.
- Re-calculate the heat load capacities and provide an assessment of the amount of saved carbon and report to KCC.
- Engage specialist engineering installers for cost and schedule assessments for each phase of the district heating system. Review potential revenues & economic benefits.
- KCC are a key stakeholder in actively delivering district heating.

Appendix A. References

The list below is of references used in this feasibility assessment.

- https://www.gov.ie/en/publication/6223e-climate-action-plan-2021/
- https://www.gov.ie/en/publication/3f132-district-heating-steering-group/
- https://www.legislation.gov.uk/eudr/2018/2001
- https://www.iea.org/policies/13353-eu-directive-20182002-on-energy-efficiency
- https://www.cibse.org/knowledge-research/knowledge-resources/knowledge-toolbox/benchmarking-registration
- https://www.codema.ie/images/uploads/docs/district_heating_brochure.pdf
- https://www.codema.ie/projects/local-projects/dublin-district-heating-system-1
- https://www.codema.ie/images/uploads/docs/Dublin_City_Spatial_Energy_Demand_Analysis_-_June_2015.pdf
- https://www.seai.ie/publications/2016_RDD_79._Guide_District_Heating_Irl_-_CODEMA.pdf
- https://www.nweurope.eu/media/12186/ireland-heatnet-nwe_lt-wp11_updated2020.pdf
- http://millenniumpark.ie/

Appendix 4.11
Substation Application – Architectural Design Statement

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RECEIVED: 13/08/2024

Herbata Data Centre Campus – ESB Substation, Naas, Co. Kildare

22217-RKD-XX-XX-RP-A-0002
Architectural Design Statement

Purpose of issue: Issued for Information
Revision: P04

April 2024

Contents

1.0 Introduction

The following report describes the architectural design rationale of the Electricity Substation of Herbata Data Centre Campus, to be constructed on lands at Halverstown, Naas, County Kildare which comprises of:

- 110kV GIS Building/Grid Substation c. 1350sqm and 15m in height.
- Undergrounding of a 110kV transmission line.
- 1 No. Dropdown towers (16m in height).
- Client Control Building.
- Internal Road Layout.
- Boundary Fences.
- Underground Services (Watermain, Surface Water, Foul, Power); and
- Ancillary Works.

The overall red line boundary comprises c3.15 ha for the Strategic Infrastructure Development (SID) application. The subject site currently consists of agricultural lands to the west of the M7 and Naas town. This does not include a proposed Data Centre Campus which forms part of a separate planning application lodged with Kildare County Council (37.5 ha).

The current site use is a greenfield site and is used as agricultural land. It is bounded to the south, west & east by agricultural lands and to the north by the R409. However, the planning application for a data centre with Kildare County Council includes adjacent lands to the south, north and east.

The proposed development comprises a new electricity grid substation compound, a medium voltage switchgear and control equipment building, a building housing indoor high voltage (HV) gas insulated switchgear (GIS) equipment, high voltage busbar connections, and step-down power transformers, and underground cables connecting the proposal to the existing 110kV overhead lines that cross the proposed development site. It also includes all landscape & boundary treatment works including berming, hedgerow protection areas and security fencing.

A request was made to An Bord Pleanála under Section 182E of the Planning and Development Act, 2000 (as amended) to enter into a pre-application consultation with the Board in relation to the provision of a new grid substation, the undergrounding of an existing 110kV transmission cable along with associated and ancillary works.

This was confirmed by An Bord Pleanála that the SID application should be made directly to ABP. ABP confirmed that the proposed grid development meets the relevant criteria and constitutes Strategic Infrastructure Development (SID) under Section 182A & 182B of the Planning and Development Act, 2000 (as amended).

The proposed Herbata Data Centre Campus development will be subject of a planning application to Kildare County Council. It does not comprise of strategic infrastructure development; either under section 37A (Seventh Schedule) or section 182A of the Act. Based on recent precedence, the appropriate application route for same is to the planning authority under section 34.

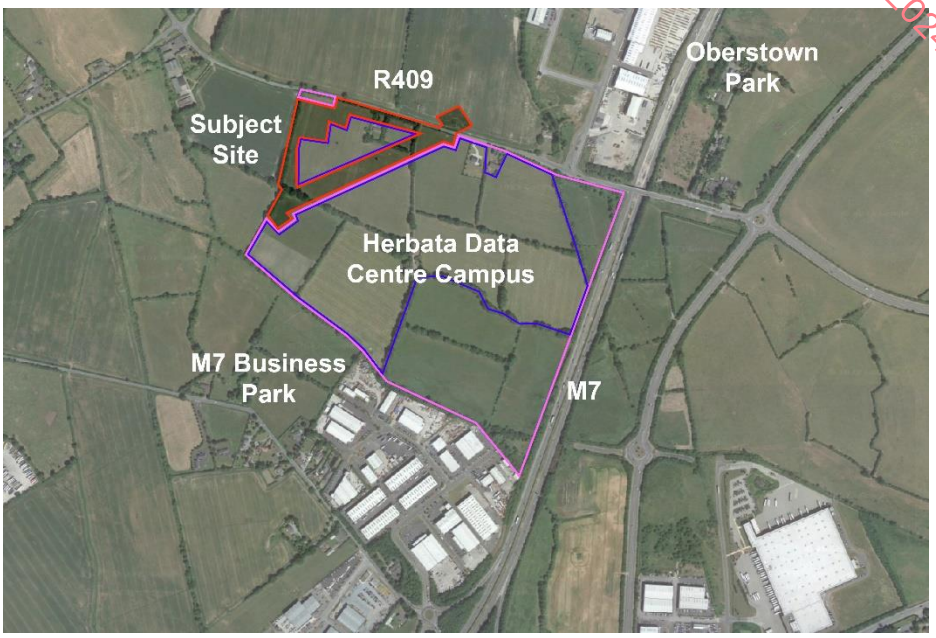
It is submitted, however, that the on-site 110KV substation and loop-in infrastructure which will facilitate export of the generated electricity to the National Grid, comprises of electricity transmission development, is Strategic Infrastructure Development and accordingly falls under the provisions of section

182A of the Act. Accordingly, a dual approach to consent for the entire development is necessary.

2.0 Site & Surrounding Areas

2.1 Existing Site Location

Picture 01 | Site Context



The site is located within Halverstown, outside of Naas, Co. Kildare.

The overall red line boundary comprises c3.15 ha for the SID application. The subject site currently consists of agricultural lands to the west of the M7 and Naas town. This does not include the Data Centre Campus which forms part of a separate planning application (37.5 ha).

The current site use is a greenfield site and is used as agricultural land. It is bounded to the south, west & east by agricultural lands and to the north by the R409.

To the north and south of the site, the lands are mainly used for commercial/industrial purposes (M7 Business Park & Oberstown Business Park) and agricultural uses. The electricity substation will form part of the Herbata Data Centre Campus.

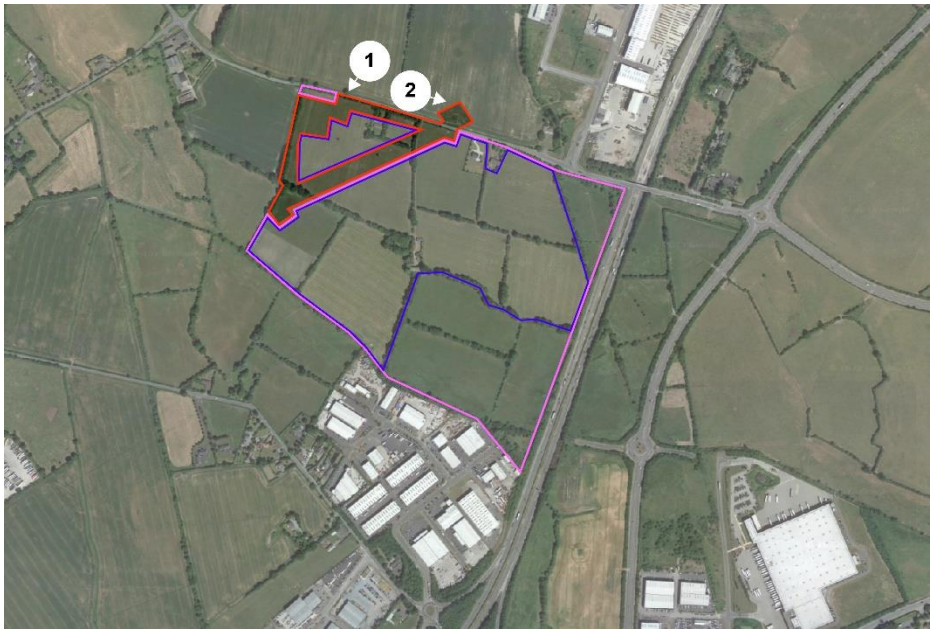
A 2-storey house and farm buildings are located approx. 200m to the west of the site (this will be demolished as part of the Data Centre Campus planning application), whilst some bungalow and 2 storey houses are located approx. 250m to the south of the site. There is a bungalow immediately to the north of the site, across the R409.

There is a 110kv overhead powerline that crosses the site. Part of this SID application is to reroute this underground as per the engineers' details.

Picture 02 | View of existing site from Google Streetview – Image 1 on Key Plan.

Picture 03 | View of existing site from Google Streetview – Image 2 on Key Plan.

Picture 04 | Key Plan of site showing location of street views.

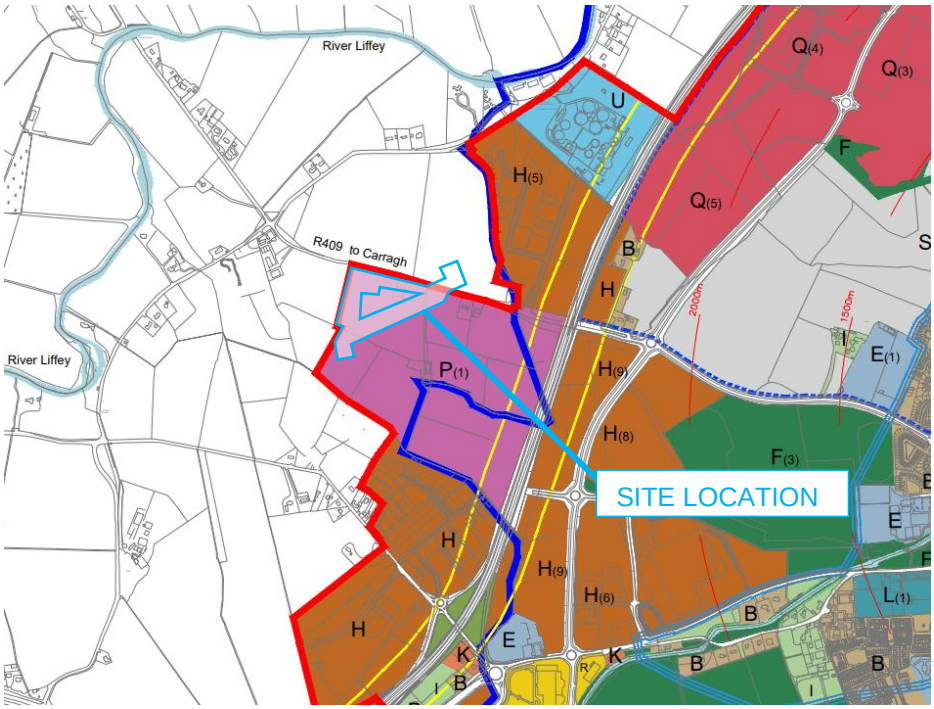


2.2 Site Zoning

It is Government Policy as set out in the National Planning Framework and the Government Statement on "The Role of Data Centres in Ireland" to promote Ireland as a sustainable international destination for Information Communications Technology (ICT) infrastructure such as Data Centres. Within Naas, 2 sites have been designated for the development of Data Centres and *'The Council will not consider any alternative use on these lands, other than those associated with Data Centres (Objective EDO 1.12)'*. The subject site (as shown in the zoning map below) is one of these allocated sites. The proposed development of a GIS substation is to assist in the energy production on-site.

Both the Kildare County Development Plan (2023-2029) and the Naas LAP acknowledge the necessary development of Data Centres within Kildare and their importance in terms of employment and economic opportunities.

The proposed development accords with the land use zoning set out in the Naas Local Area Plan 2021 -2027 ("Naas LAP") and will deliver local employment and anchor the ICT sector more firmly within Naas and the Greater Dublin Area more generally.



Picture 05 | Extract from Naas Local Area Plan (2021 – 2027): Land Use Zoning Map.

Site location marked in red by authors of this report.

Naas Local Area Plan (2021-2027) Legend:

P: Data Centre(C7)

Ref.	Land Use	Land-Use Zoning Objectives
P	Data Centre	To provide for Data Centre development and their associated infrastructure only.

Picture 06 | Extract from Naas Local Area Plan (2021 – 2027): Section 11.1 – Land Use Zoning Objectives

Within the KCC Development Plan, Chapter 7 states *'Where data centre developments are approved in the County, the Council will expect district heating systems to be developed for adjoining residential, community and/or commercial developments.'* A portion of the site has been allocated to house any required district heating infrastructure which will connect back to the surrounding area for future energy requirements.

2.3 Site Constraints

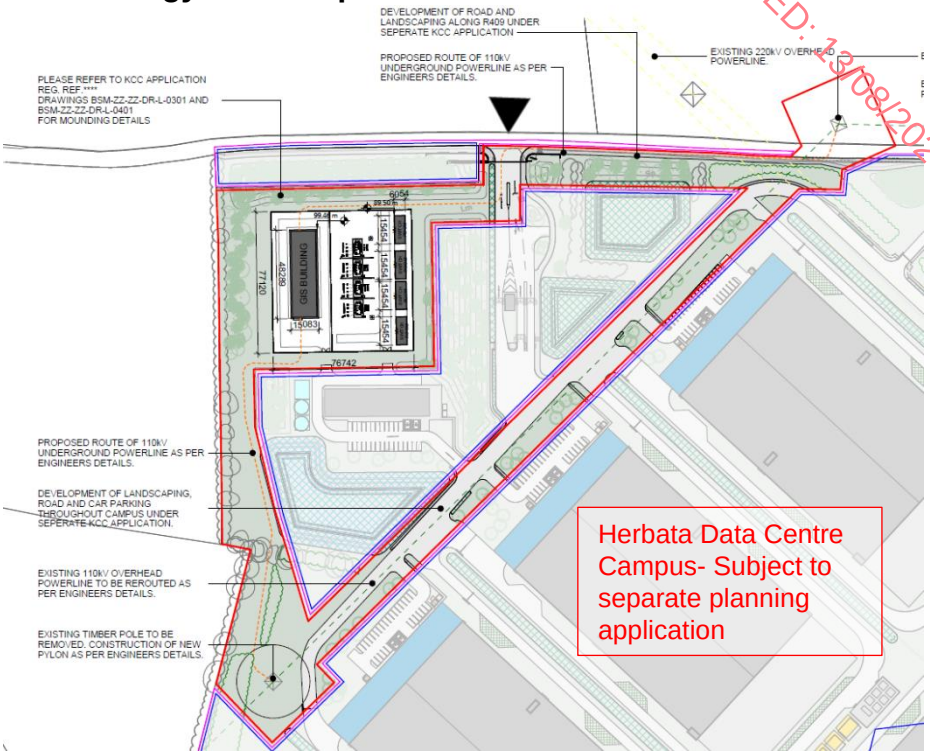
There are a number of existing conditions on-site which have been precisely analysed and that have shaped the proposed design approach.

- Existing hedgerows
  As the site has been used previously for agricultural uses, many hedgerows divide the site. These will be retained where possible, particularly on the external boundaries of the subject site to aid in screening and help promote biodiversity on-site.

- 110kv Overhead power lines
  110kv powerlines are to be rerouted underground to allow for the development of the GIS Substation on site. The proposed GIS substation and partial undergrounding of EirGrid's 110kV overhead lines are part of the Strategic Infrastructure Development (SID) planning application to An Bord Pleanála as it involves changes to electricity transmission.

3.0 Concept Ideas

3.1 Site Strategy – Masterplan



Picture 07 | Proposed Site Plan of ESB Substation

It is proposed to develop a new electricity grid substation compound, a medium voltage switchgear and control equipment building, a building housing indoor high voltage (HV), GIS equipment, high voltage busbar connections, and step-down power transformers, and underground cables connecting the proposal to the existing 110kV overhead lines that cross the proposed development site.

The proposed development consists of the following:

— 110kV GIS Building/Grid Substation c. 1350sqm and 15m in height.
— Undergrounding of a 110kV transmission line.
— 2 No. Dropdown towers (16m in height)/compound.
— Client Control Building.
— Internal Road Layout.
— Boundary Fences.
— Underground Services (Watermain, Surface Water, Foul, Power); and
— Ancillary Works.

The site area for the proposed works is 3.15ha. The development includes enabling works, services diversions, connections to the proposed grid substation, landscaping, security fencing and berms, provision of internal access arrangements within the grid substation compound. All other supporting services, associated construction works, and ancillary works will form part of the proposed Herbata Data Centre Campus planning application.

Access to the substation will be internally from the Herbata Data Centre Campus. The use of landscaping such berming and planting will help to assimilate the substation into the overall Data Centre Campus.

3.2 Enhancing the Public Realm

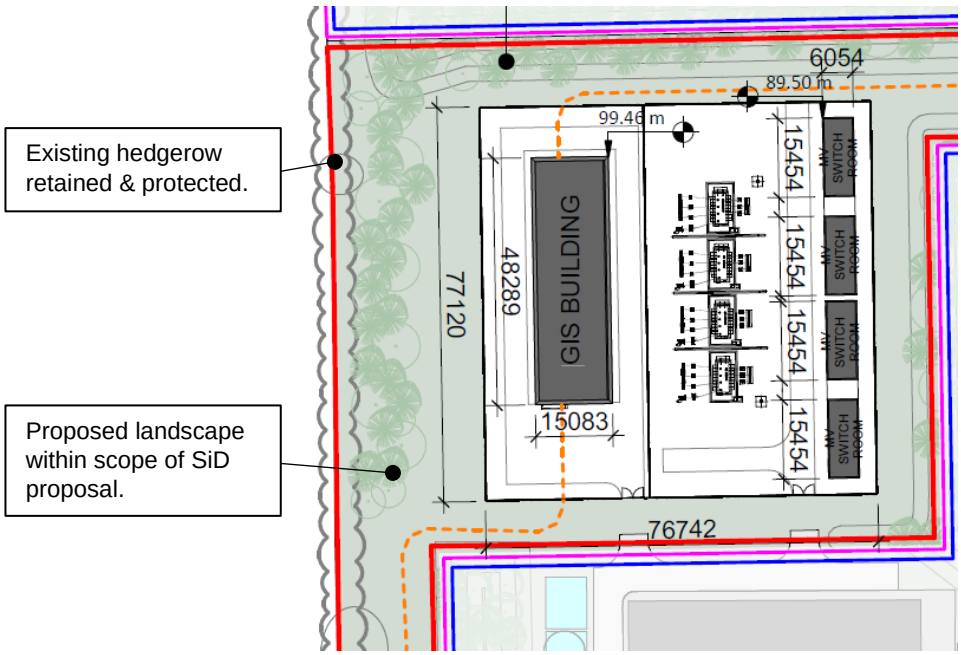
Kildare County Development Plan (2023-2029) Chapter 15.3. where a development requires a design statement, states the following details should be included:

'A demonstration of how the development adheres to the relevant provisions of the County Development Plan, including explicit reference to the Urban Design Standards Checklist, as outlined in Table 14.2.'

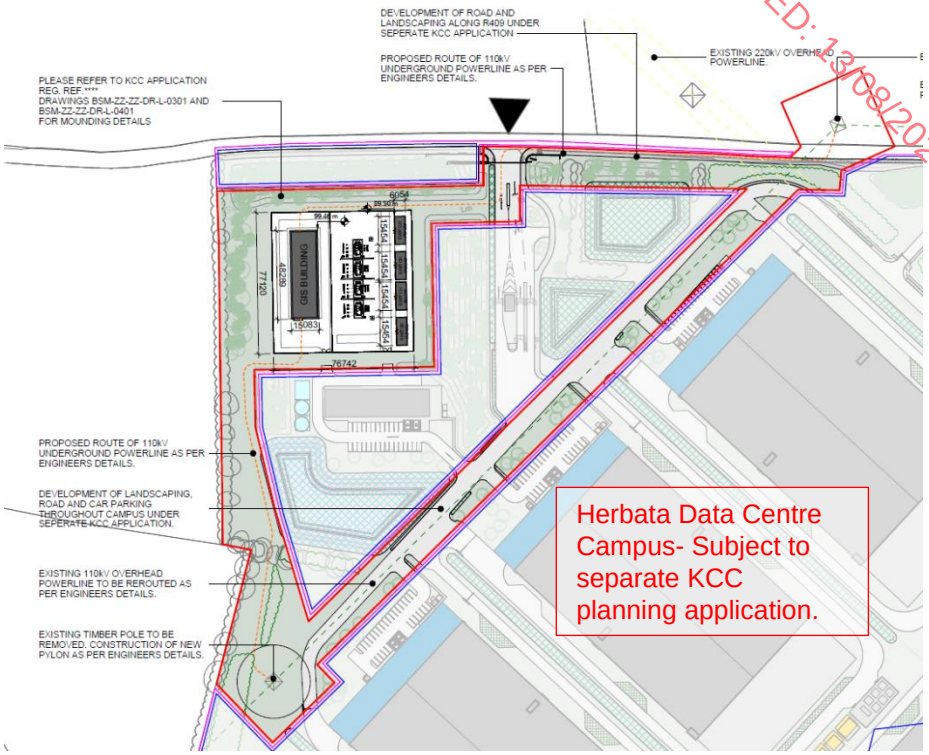
All planting and landscaping are proposed as part of the Herbata Data Centre Campus planning application except for additional planting to the west of the site. This will allow the substation development to assimilate within its surroundings. For full details see landscaping drawings.

The Herbata Data Centre Campus masterplan includes a landscape strategy that create an attractive site layout using landscaping such as planting, ponds and berming. Retained vegetation within the site along with new proposed tree planting will aid in framing the proposed built form within a naturalistic setting forming a juxtaposition between the industrial forms of the data centres and their natural surroundings.

Picture 08 | For further information, see BSM drawing - BSM-ZZ-ZZ-DR-L-0301



4.0 Proposed Site Plan



Picture 09 | Overall Proposed Site Plan

There is a vehicular and pedestrian site entrance to Herbata Data Centre Campus located in the north corner of the site.

Access to the substation will be from the main internal access road within the Herbata Data Centre Campus, behind the Water Treatment Plant and Administration Workshop. Planting and berming will surround the substation to aid screening of this on site and from the R409.

All car parking and bicycle parking for the Substation will be provided at the Administration Workshop.

These developments throughout the site form part of the Herbata Data Centre Campus planning application.

4.1 Site Phasing

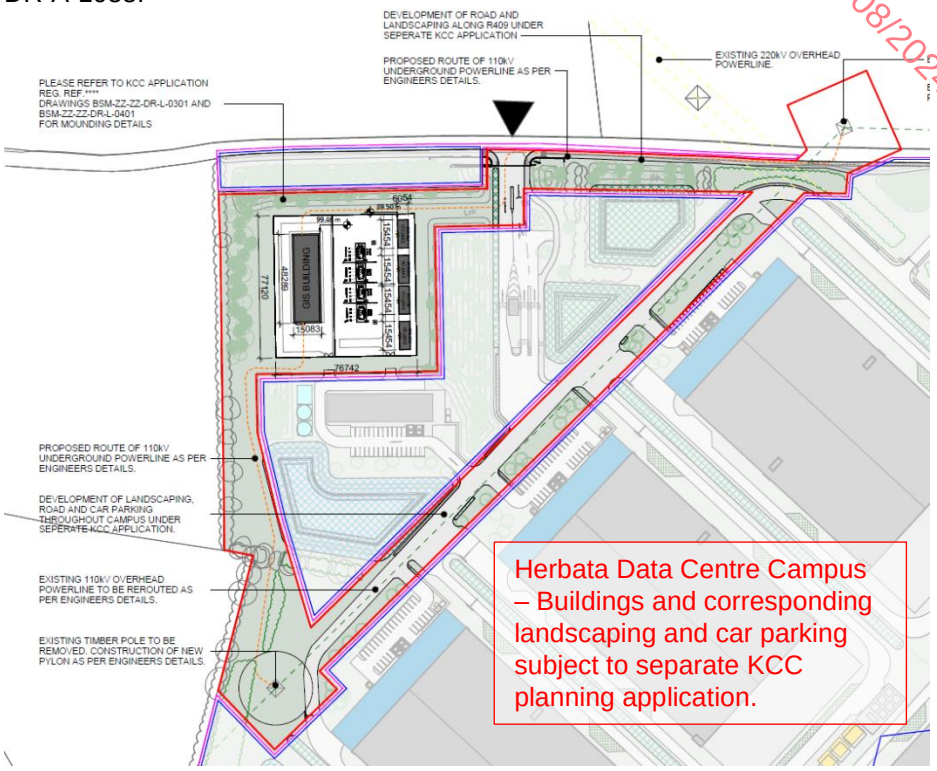
Given the scale of the proposal for the Herbata Data Centre Campus, site phasing is proposed for the construction of the data centres and ancillary buildings. 3 phases are proposed for all works throughout the site.

The proposed GIS substation and partial undergrounding of EirGrid's 110kV overhead lines is to be completed in Phase 1.

All other works on the Herbata Data Centre Campus will form part of a separate planning application and are to be completed in phases 1 -3.

5.0 Design & Layout

The site layout is shown below, for full details see doc. 22217-RKD-ZZ-ZZ-DR-A-1055.



Picture 10 | Proposed Site Plan of ESB Substation

An existing overhead 110 kV transmission circuit currently enters the site from the north and west sides of the Herbata Data Centre Campus site and will be taken down by line/cable (L/C) dropdown towers and undergrounded and brought to the proposed new Grid Substation. Between the L/C dropdown towers, a new underground 110kV cable circuit will run from the proposed 110 kV GIS grid substation, connecting to each of the L/C dropdown towers. The obsolete section of the overhead 110kV line from the proposed dropdown towers, including the supporting poles, will then be taken down and removed from the site.

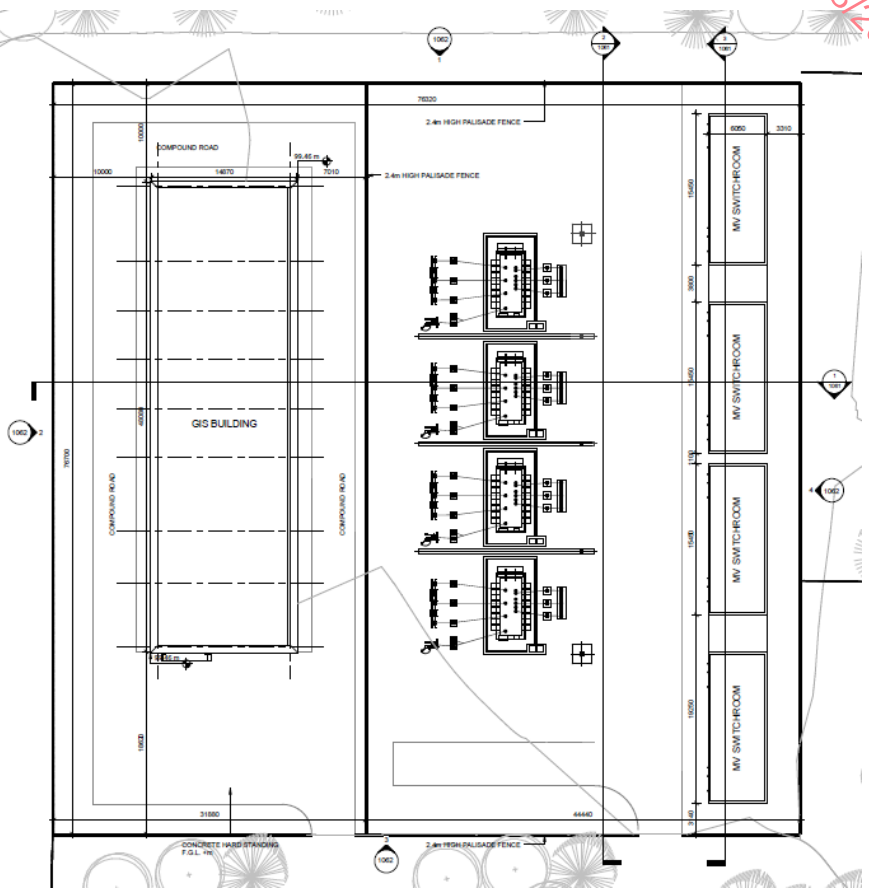
The new circuit will terminate in a cable – overhead line/cable (L/C) interface compound containing air-insulated electrical equipment mounted on concrete plinths. Adjacent to each L/C interface compound, an overhead line tower will be erected to facilitate connection of the new underground cables to the two existing 110 kV overhead lines. Each new overhead line tower will be approximately 16 metres in height, set on top of concrete foundations.

For full details, see Engineer's drawings and reports.

The development includes enabling works, services diversions, connections to the proposed grid substation, landscaping, security fencing and berms, provision of internal access arrangements within the grid substation compound. All other supporting services, associated construction works, and ancillary works will form part of the proposed data centre planning application.

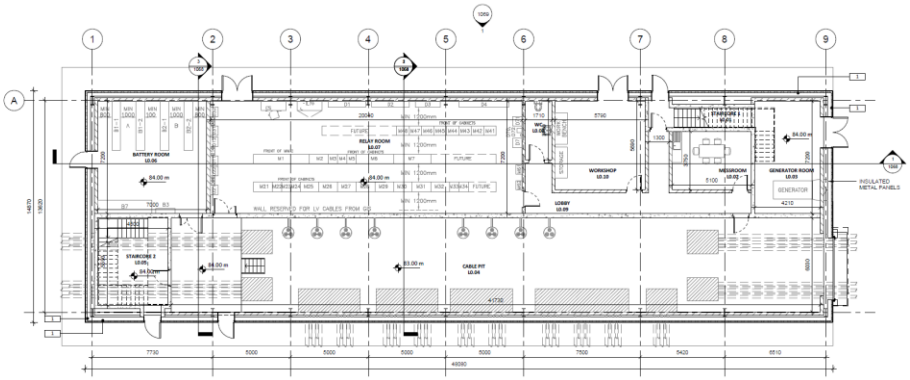
The substation development is to be made of two elements, the first being a new node on the Irish electricity grid at Naas, which will be handed over and be operated by EirGrid ESO as the transmission system operator (TSO); the second element will comprise the transformation to a lower voltage to enable distribution to the new proposed data centre development.

Picture 11 | Proposed ESB Substation Compound Plan

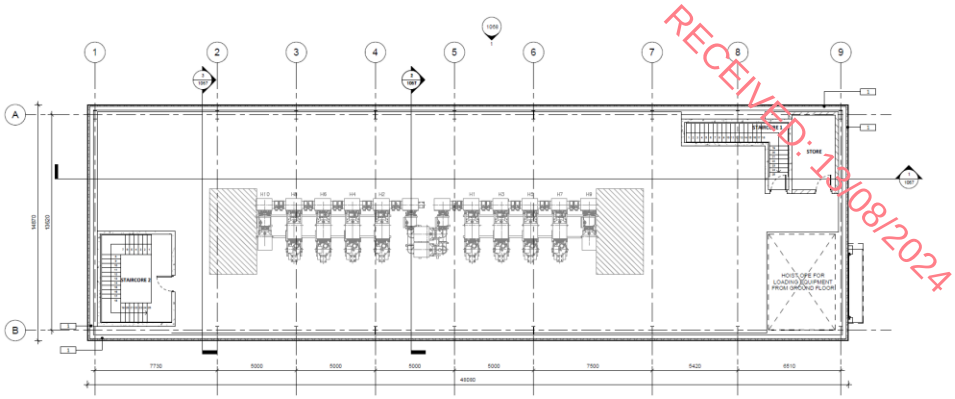


The proposed new Grid Substation is to be based on EirGrid's standard arrangements for 110kV based switchgear. EirGrid also have standard arrangements for GIS that they use on their network, these require the switchgear to be housed in a 2-storey building to enable safe operation and cable entry.

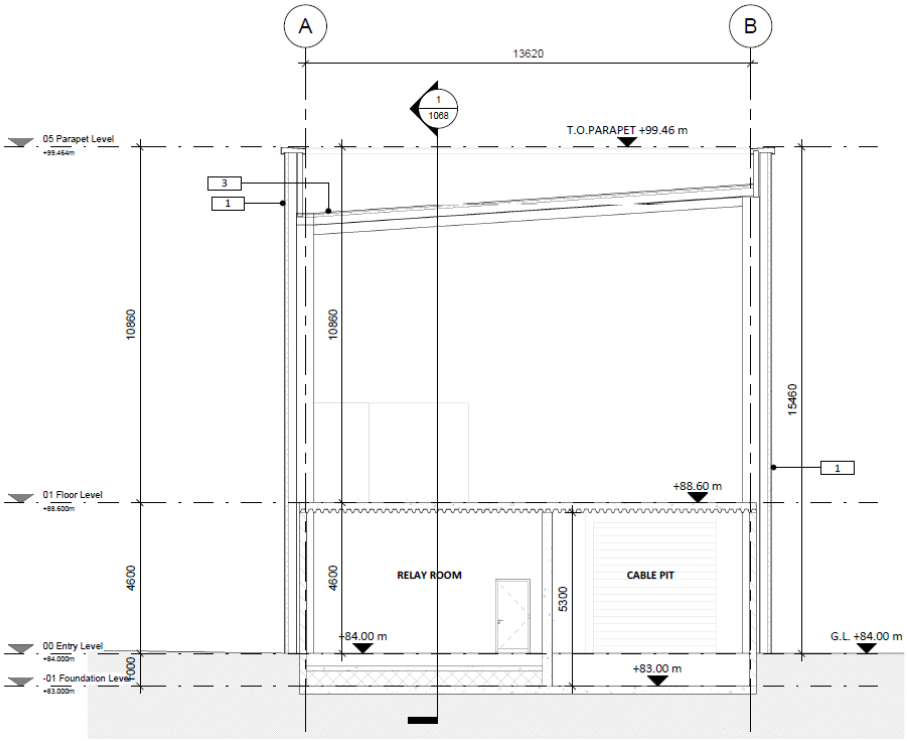
Picture 12 | Proposed ESB Substation – Ground Floor Plan



Picture 13 | Proposed ESB Substation – First Floor Plan



Picture 14 | Proposed ESB Substation – Section



Using this standard arrangement for a GIS grid station, the substation on the data centre development has been arranged to have two sections, the first to fully incorporate the arrangement of the EirGrid 8-bay GIS grid station and the second section to incorporate the local distribution and step-down transformers for the data centre development itself.

It should be noted that the development site also has a 220kV transmission line crossing the site, operated by EirGrid. No works are intended to the line, but the exclusion zone either side of the line will be observed fully.

The main stakeholders for the development are as follows:

- EirGrid, is responsible for operating and developing the national high voltage electricity transmission grid in Ireland;

- ESB Networks (Asset Owner), is responsible for carrying out maintenance, repairs and where works are not contestable, the construction of the national high voltage electricity grid in Ireland;

- Herbata Limited's role for this project is to act as the Developer/Applicant.

Picture 15 | CGI of Substation Compound

5.1 Building Height

Due to the size of the plant required within the Substation, this is a large building measuring at approx. 15m in height.

No. 4 MV Rooms are located on the site, each measuring at approx.6m in height.

There is a 2.4m high palisade fencing surrounding the site.

5.2 Elevation Design and Materials

The design of the Substation is in keeping with the main data centre building, i.e. use of flat composite panels in light grey colour.

Much of the site will be partially hidden through proposed landscaping including berming and planting. This is to hide views of the Substation site from the overall Herbata Data Centre Campus and from the R409. To the west of the site, existing hedgerows are to be maintained and augmented to further hide the views from neighbouring site.

The no. 4 MV Rooms will be finished with render in a selected colour.

Picture 16 | CGI of Substation Compound

6.0 Schedule of Areas

Refer to RKD sheets -

22217-RKD-ZZ-ZZ-SH-A-1075

Picture 17 | Area Schedules

GIS BUILDING - GROSS INTERNAL AREA

LEVEL	NAME	AREA
00 Entry Level	GIS GROUND FLOOR - GIA	626.1 m²
00 Entry Level		626.1 m²
01 Floor Level	GIS FIRST FLOOR - GIA	626.1 m²
01 Floor Level		626.1 m²
GROSS INTERNAL TOTAL AREA		1,252.2 m²

MV ROOM - GIA & NIA

LEVEL	NAME	AREA
00 Entry Level	MV ROOM 1	84.0 m²
MV ROOM 1		84.0 m²
00 Entry Level	MV ROOM 2	84.0 m²
MV ROOM 2		84.0 m²
00 Entry Level	MV ROOM 3	84.0 m²
MV ROOM 3		84.0 m²
00 Entry Level	MV ROOM 4	84.0 m²
MV ROOM 4		84.0 m²
MV ROOMS - TOTAL GIA & NIA		336.0 m²

59 Northumberland Road
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+353 1 668 1055
mail@rkd.ie
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RKD

Appendix 4.12
Substation Application – Planning Engineering Report

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Planning Engineering Report
ESB Substation SID

10360452-HDR-XX-00-RP-C-000001

Herbata Data Centre Campus

Naas, County Kildare
June 7, 2024

Prepared By: HDR & Donnachadh O'Brien Associates
Edited By: Richard Kiernan DOBA
Authorised By: Ulrich Groenewald HDR
Issue: P03
Status: Issue for Planning

Document Control

Issue	Date	Status	HDR Author ([XX/XX/XX].[Initials])	HDR Approval ([XX/XX/XX].[Initials])	Notes
P01	12/07/2023	Draft 1	HDR & Donnachadh O'Brien	JM	Stage 2 Engineering Design
P02	07/09/2023	Draft 2	HDR & Donnachadh O'Brien	JM	Stage 2 Engineering Design
P03	07/06/2024	Issued for Planning	HDR & Donnachadh O'Brien	UG	Stage 2 Engineering Design

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Appendices

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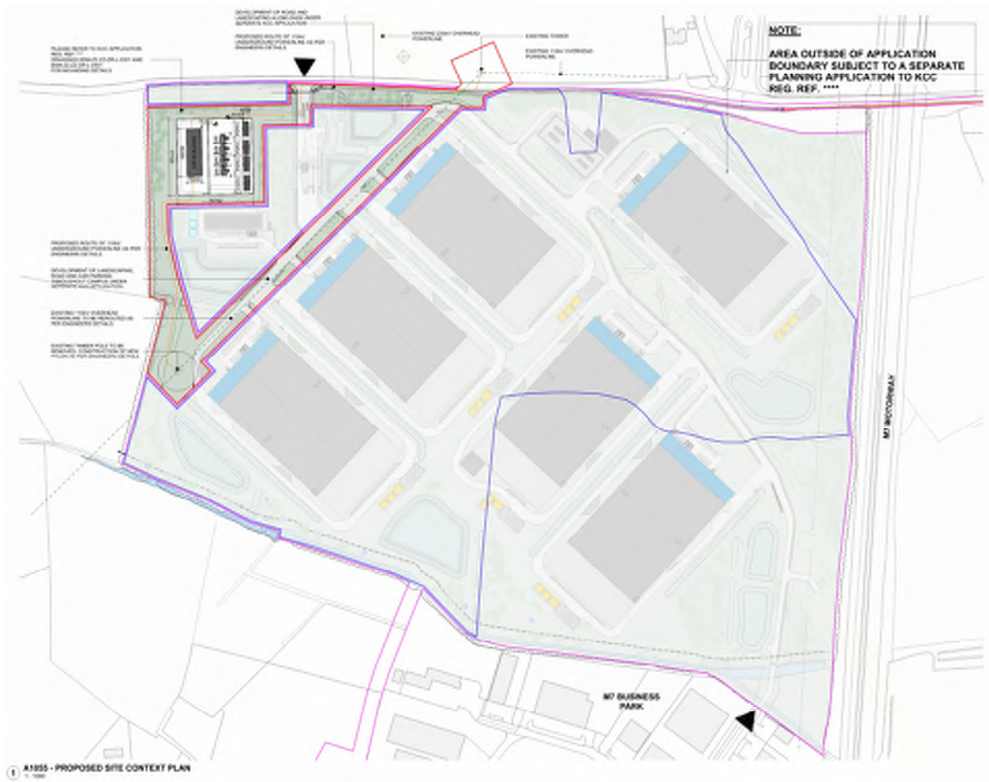
1 Introduction

This report has been prepared by Donnachadh O'Brien & Associates, Consulting Engineers, in support of the Strategic Infrastructure Development (SID) application for the proposed ESB Substation of the Herbata Data Centre Campus development to be constructed on lands at Halverstown, Naas, County Kildare. The subject lands are located on the western side of the M7 motorway, positioned between Junctions 9a and 10. The site is bound to the north by the R409 road which provides a direct link to the centre of Naas, approximately 2.5km to the east. The site is bounded to the east, west and south by agricultural lands. The agricultural lands to the east and south are the location of the proposed Herbata Data Centre Campus which is subject to a separate planning application to Kildare County Council.

The proposed development comprises a new electricity grid substation compound, a medium voltage switchgear and control equipment building, a building housing indoor high voltage (HV) gas insulated switchgear (GIS) equipment, high voltage busbar connections, and step-down power transformers, and underground cables connecting the proposal to the existing 110kV overhead lines that cross the proposed development site. It also includes all landscape & boundary treatment works including mounding, hedgerow protection areas and security

Figure 1-1. Proposed Substation Site Layout within Herbata Data Centre Campus



This report outlines the proposed engineering infrastructure for the development works under the following areas:

- Surface Water Drainage
- Foul Water Drainage
- Water Supply
- Roads Infrastructure (Access)

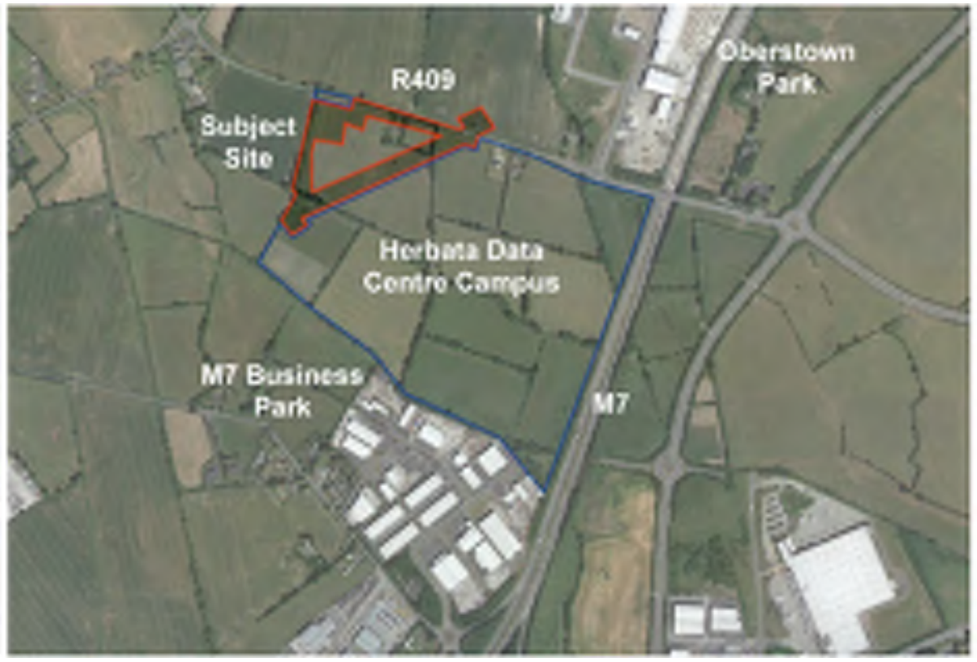
This report should be read in conjunction with the engineering drawings submitted in support of the planning application. Refer to the drawing register sheet in Appendix A.

2 Existing Drainage and Water Supply Services

The site, shown in the Figure 2 1 below, is located approximately 2.5km to the west of Naas town center in County Kildare. The site is bounded to the east, west and south by agricultural lands. The agricultural lands to the east and south are the location of the proposed Herbata Data center Campus which is subject to a separate planning application to Kildare County Council.

The overall red line boundary comprises approximately 3.15 hectares for the SID application. The subject site currently consists of agricultural lands to the west of the M7 and Naas town. This does not include the Data Centre Campus which forms part of a separate planning application. The site in level varies between +85.500m AOD and +81.0 AOD, and slopes generally from Northeast to Southwest.

Figure 2-1. Existing Site Layout (Source - Google map extract)

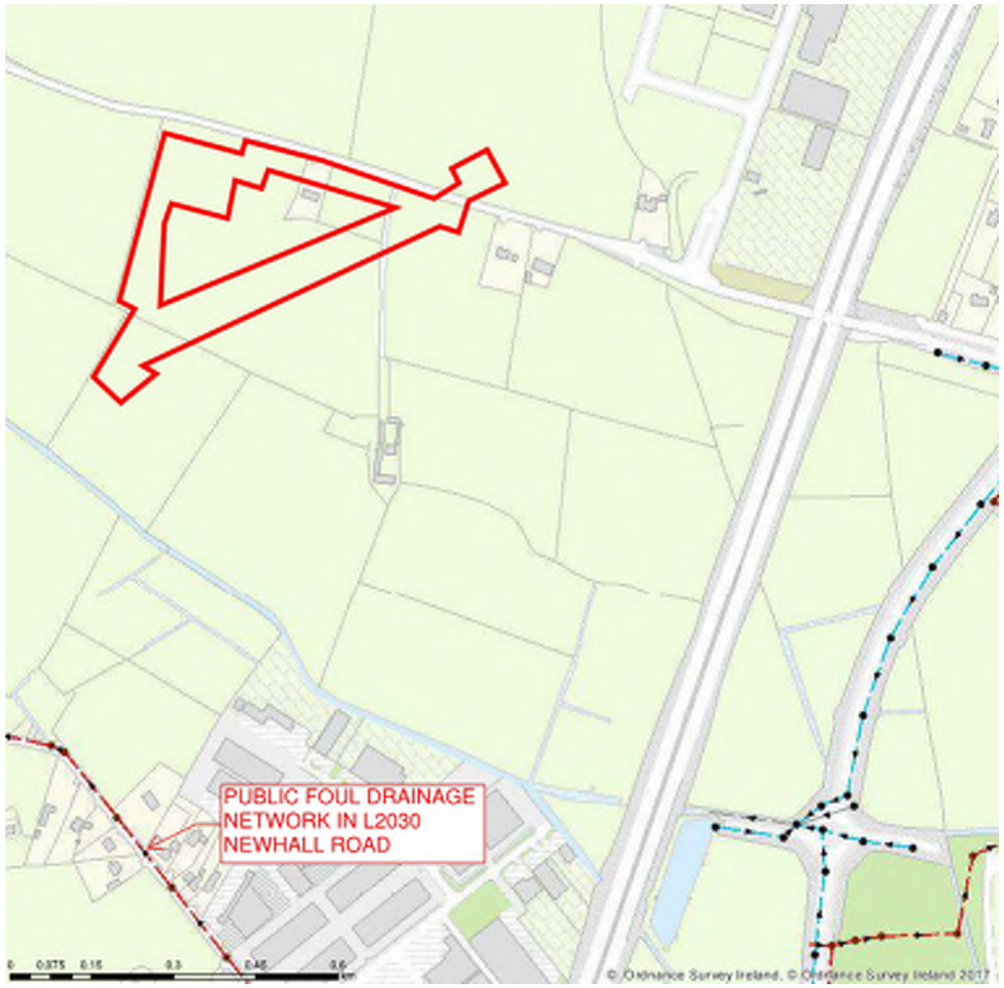


3 Existing Drainage and Water Supply Services

3.1 Existing Drainage

The existing site is not served by any public or formal surface water or foul water drainage network, as is illustrated in Figure 3 1 below which is an extract from the available Kildare County Council / Uisce Eireann public drainage mapping.

Figure 3-1. Extract from Uisce Eireann Drainage Mapping



The nearest public foul drainage network is located approximately 275m to the south of the site and runs along the L2030, Newhall Road. Uisce Eireann mapping indicates that there is an existing 300mm public drainage infrastructure to the south of the site which conveys flows along the L2030 Newhall Road. Flows are conveyed to the existing Newhall Wastewater Pumping Station which is located to the west of the proposed site as seen in Figure 3-2.

Flows from the Newhall Wastewater Pumping station are pumped via rising main to the Osberstown Wastewater Treatment Plant to the north of the site.

Figure 3-2. Existing Foul Drainage Network in L2030 / Pump Station

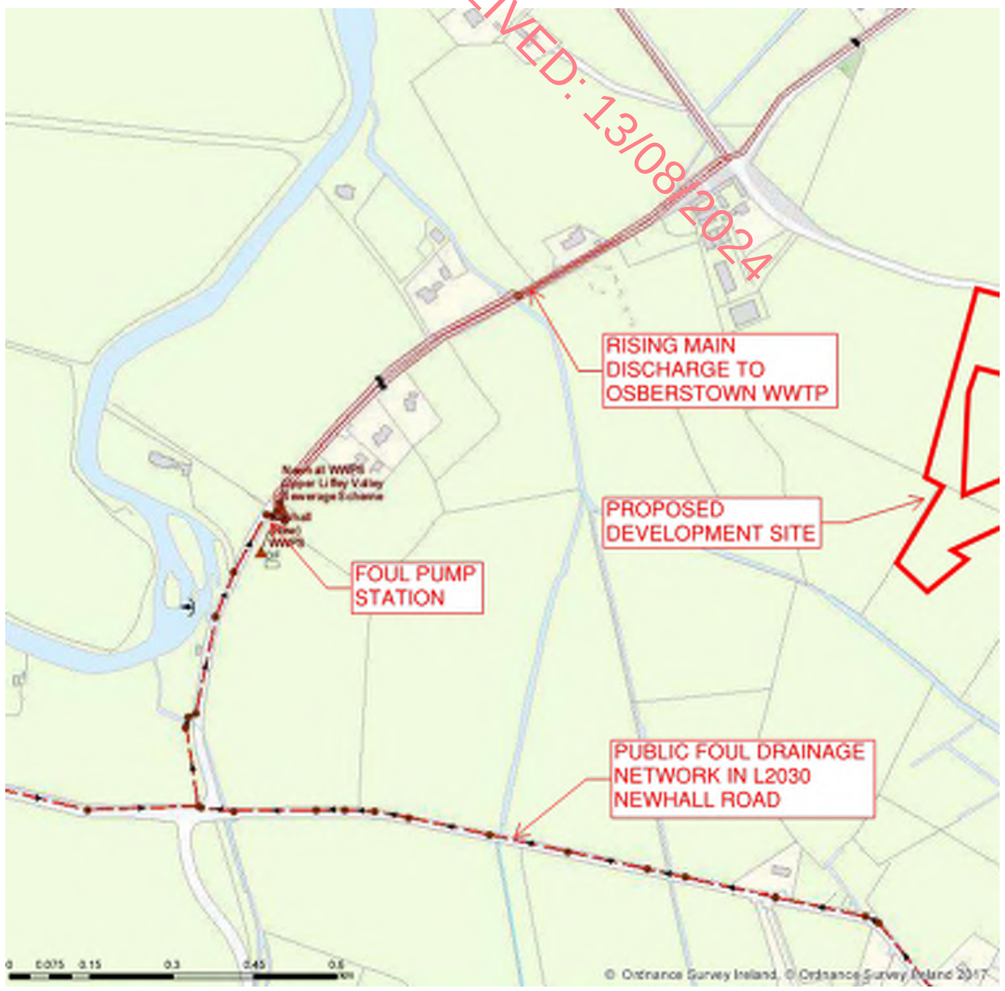
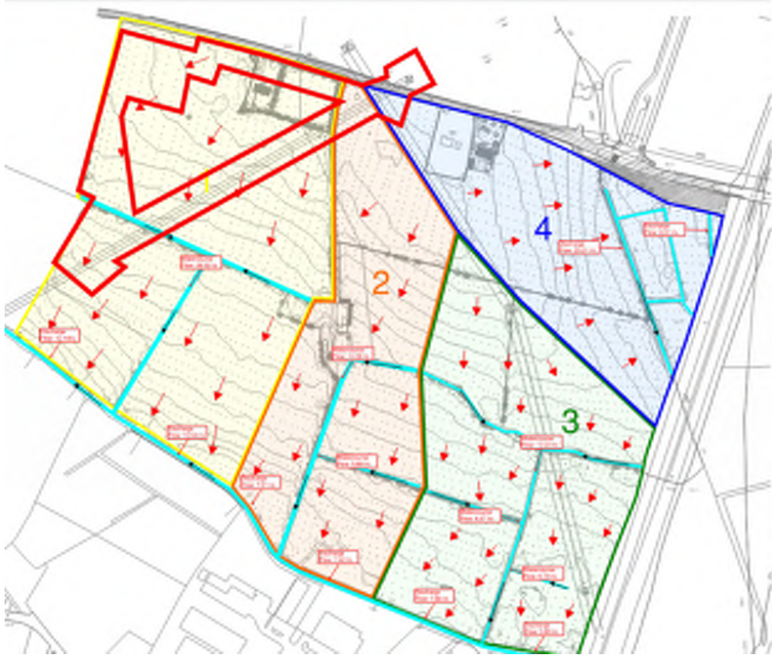


Figure 3-3 below indicates the extent of the existing field boundaries and existing ditches of the proposed substation site and adjoining agricultural lands. For the purposes of the surface water management design, we have identified below the existing discharges and the natural sub-catchments on the site. The proposed substation SID lies predominately within Catchment 1. Currently surface water from rainfall on the subject site flows across the land and is collected in several ditches which traverse the adjoining agricultural lands and discharge into the Bluebell Stream (also known as the Yeomanstown watercourse) which runs in a northwest direction along the southern boundary of the site.

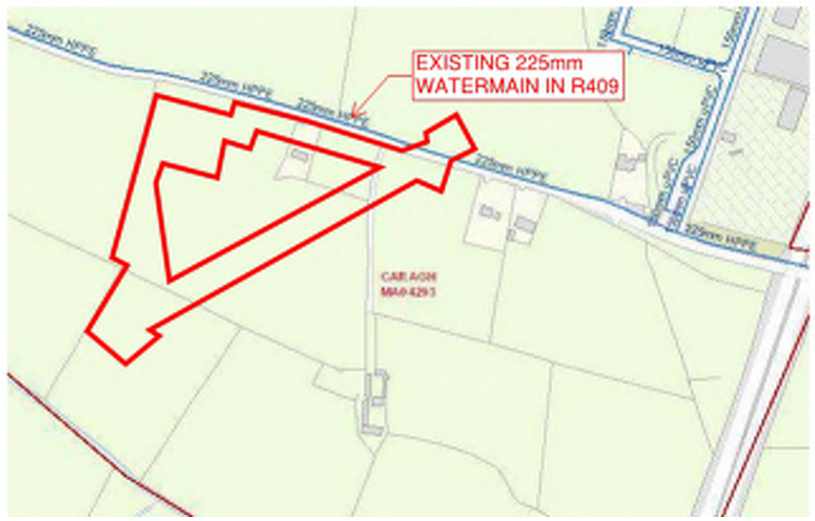
Figure 3-3. Existing Overland flow paths and Catchment areas of agricultural lands.



3.2 Existing Water Supply

The Uisce Eireann (UE) record drawings indicate the presence of a 225mm diameter HPPE watermain to the north of the site along the R409 as illustrated in Figure 3-4 below. The location of the watermain was verified following a Ground Penetrating Radar (GPR) survey of the existing site and adjacent roads which was commissioned by the Applicant.

Figure 3-4. Existing Watermain Location



3.2.1 Pressure Testing

The Applicant commissioned SES Water Management to carry out Fire Flow Simulation Testing on the nearest existing hydrants to the site. The hydrant was pressure logged for a period of 7 days which determined that the existing flow rate is approximately 26 l/s. The Pressure Testing Report is included in **Error! Reference source not found.** of this report.

Figure 3-5. Extract from Hydrant Pressure Testing Report – Hydrant Locations and Test Results

FH No.	Surface	Cover / Frame	Pit	Type	Depth	Marker / Plate	Canary Yellow	Spindle	Operating	Comments
1	Grass	Poor	Good	LUG	290	Yes	No	Good		No Plinth
2	Grass	Poor	Good	LUG	370	Yes	No	Missing		No Plinth
3	Grass	Poor	Good	LRT	520	Yes	No	Good		No Plinth

4 Proposed Surface Water Drainage

4.1 Existing Ground Conditions - Site Investigation

A suite of ground investigations, refer to **Error! Reference source not found.**, has been carried out on the overall site by IGSL Ltd. which includes the following;

- Cable Percussive Boreholes
- Trial Pits
- BRE365 Soakaway Tests
- Dynamic Probes
- Plate Bearing Tests
- Ground Water monitoring
- Geotechnical Laboratory Testing

Figure 4-1. Extract from Site Investigation – S.I. Locations Layout.

In summary the results of the ground investigations yielded the following findings:

- The underlying strata consists of predominately silty/sandy gravelly CLAYS.
- Ground water monitoring was carried out by IGSL during the site investigation, over a 6 months period. Water strikes (seepage, slow and moderate inflows) were intercepted during shallow trial pit excavations, with groundwater also struck during borehole construction at BH01, BH02, BH04 and BH12. A well installed in BH13 later reported water. Except for TP30 and BH12 in the northeast, shallow groundwater was found towards the south of the site, near the stream boundary. For the most part the groundwater entries were reported as seepages in trial pits, frequently in gravel horizons at the base of trial pits at circa. 3.0m depth. Refer to section 5.3 of IGSL report in **Error! Reference source not found.**.
- BRE635 soakaway testing yielded variable results across the site with poor infiltration rates to the south of the site and poor to moderate infiltration in some of the northern portions of the site with rates of approximately 5x10-6 m/s being determined (see Figure 4-2 below).

Disposal of surface water run-off to ground via infiltration will vary across the site with infiltration generally not practical across the central and southern portion of the site for significant surface water disposal. Some surface water infiltration is feasible along the northern boundary, adjacent to the R409 road.

Figure 4-2. Extract from Site Investigation – BRE 365 Infiltration Testing

Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown Contract No. 24330
Test No. SA06 (Cycle 1)
Client DOBA
Date: 10/10/2022

Summary of ground conditions

from	to	Description	Ground water
0.00	0.40	TOPSOIL: Soft brown sandy CLAY with rootlets. Sand is fine to	Dry
0.30	1.20	Firm brown sandy gravelly CLAY. Sand is fine to coarse. Grave	
1.20	2.00	Grey brown gravelly silty SAND with a low cobble content. Sanc	

Notes: Samples: AA181953
AA181954

Field Data

Depth to Water (m)	Elapsed Time (min)
1.12	0.00
1.13	1.00
1.14	2.00
1.14	3.00
1.15	4.00
1.15	5.00
1.16	6.00
1.16	7.00
1.17	8.00
1.17	10.00
1.17	12.00
1.18	14.00
1.18	16.00
1.18	18.00
1.19	20.00
1.19	25.00
1.19	30.00
1.20	35.00
1.20	40.00
1.21	50.00
1.22	60.00

Field Test

Depth of Pit (D)	2.00	m
Width of Pit (B)	0.45	m
Length of Pit (L)	1.60	m
Initial depth to Water =	1.12	m
Final depth to water =	1.22	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.72	m2
*Av. side area of permeable stratum over test pe	3.403	m2
Total Exposed area =	4.123	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

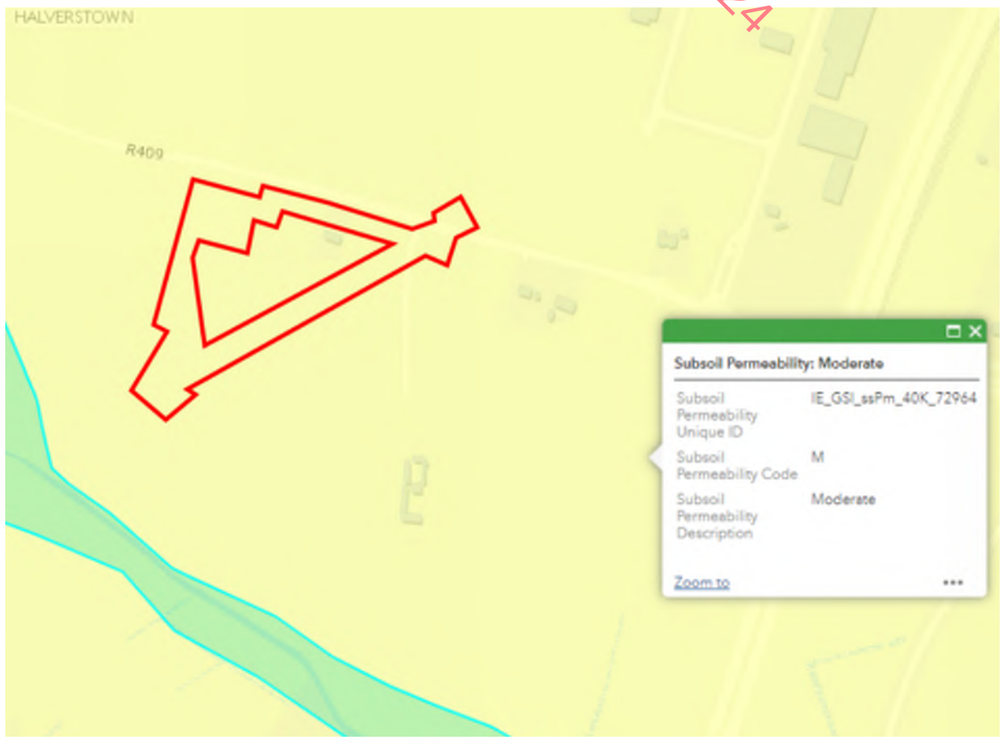
f= 0.00029 m/min or 4.851E-06 m/sec

4.2 Estimation of Greenfield Runoff Rate

4.2.1 Soil Classification

As part of the Site Investigation carried out and discussed in section 4.1 of this report above, the site comprises of predominantly silty/sandy gravelly clays with poor infiltration rates to the south of the site and poor to moderate infiltration in some of the northern portions of the site with rates of approximately 5x10-6 m/s being determined. Figure 4 3 below is an extract from the GSI website which indicates that the subsoil infiltration capacity for the site is 'MODERATE'. Which bis reflected in the IGSL site investigation conducted.

Figure 4-3. Extract from GSI Website indicating subsoil infiltration capability.



An extract from the TII publication DN-DNG-03064 (Drainage of Runoff from Natural Catchments) is shown below in Figure 4 4. This outlines the criteria for each soil type given their runoff potential. Therefore, with the Runoff potential being determined as moderate, A soil Type 3 for the Greenfield Runoff rate is deemed appropriate.

Figure 4-4. Extract from TII Publication DN-DNG-03064.

General soil description	Runoff potential	Soil class
Well drained sandy, loamy or earthy peat soils Less permeable loamy soils over clayey soils on plateaux adjacent to very permeable soils in valleys	Very low	S_1
Very permeable soils (e.g. gravel, sand) with shallow groundwater Permeable soils over rocks Moderately permeable soils some with slowly permeable subsoils	Low	S_2
Very fine sands, silts and sedimentary clays Permeable soils (e.g. gravel, sand) with shallow groundwater in low lying areas Mixed areas of permeable and impermeable soils in similar proportions	Moderate	S_3
Clayey or loamy soils	High	S4
Soils of the wet uplands: Bare rocks or cliffs Shallow, permeable rocky soils on steep slopes Peats with impermeable layers at shallow depth	Very high	S_5

In accordance with the IH24 method, the greenfield runoff for existing undeveloped sites measuring less than 50Ha can be estimated adopting the following formula and the total permissible outflow has been calculated in **Error! Reference source not found.** below.

$$Qbar_{rural}(m^3/s)=0.00108x(Area)^{0.89}(SAAR)^{1.17}(SOIL)^{2.17}$$

Table 4-1. Estimation of Greenfield Runoff Rate (Qbar)

Standard Average Annual Rainfall (SAAR)	848	mm
Soil Index	0.47	
Total Site Area	0.6	Hectares (ha)
Total Analysed Area	0.6	Hectares (ha)
Storm Return Period	100	Years
Permissible Outflow per hectare, QBAR	6.0	l/s/ha
Total Permissible Outflow	3.63	l/s

4.3 Proposed Surface Water Strategy

The proposed Surface Water Drainage Strategy is based on applying GDSDS and SuDS best practice to provide an effective drainage design that maximises sustainability and promotes Nature-based solutions for the management of surface water run-off from the post development site.

Due to the BRE 365 soakaway testing results across the site (as outlined in section 4.1 above) the opportunities for the inclusion of significant infiltration-based surface water management are limited and it is not considered a suitable solution for the site in general, although advantage will be taken of infiltration where possible. Attenuation of SW runoff from the Substation shall be provided within the Substation site.

Due to the nature of the proposed development the opportunity for the inclusion of nature-based SUDS solutions and landscaping within the substation development is limited, however, runoff from the roof and hardstanding areas shall be directed into filter drains in the gravelled areas of the site in order to take advantage of any infiltration that may be available. The site will have large areas of gravel / crushed stone surfacing which will allow rainfall to permeate directly to ground across a large portion of the proposed substation. The filter drains will convey excess runoff from the site to the discharge point at the south of the Substation site.

It is proposed to discharge collected SW runoff from the Substation site at Qbar rates to the existing Bluebell Stream, via the Surface Water Drainage infrastructure of the proposed Herbata Data Centre Campus. Attenuation storage will be provided underground within the filter drains, with a controlled discharge from the site entering the Data Centre Campus SW network. The DC campus network design has included for the runoff from the Substation SID. A flow control device will be located on the outfall manhole from the Substation, limiting discharge to Qbar rates.

4.4 Proposed SuDS Strategy

4.4.1 Proposed SuDS Hierarchy

The SuDS hierarchy outlined in Figure 4-5 below has been considered for this development in accordance with the requirements of KCC Water Services Department, with priority given to nature-based solutions.

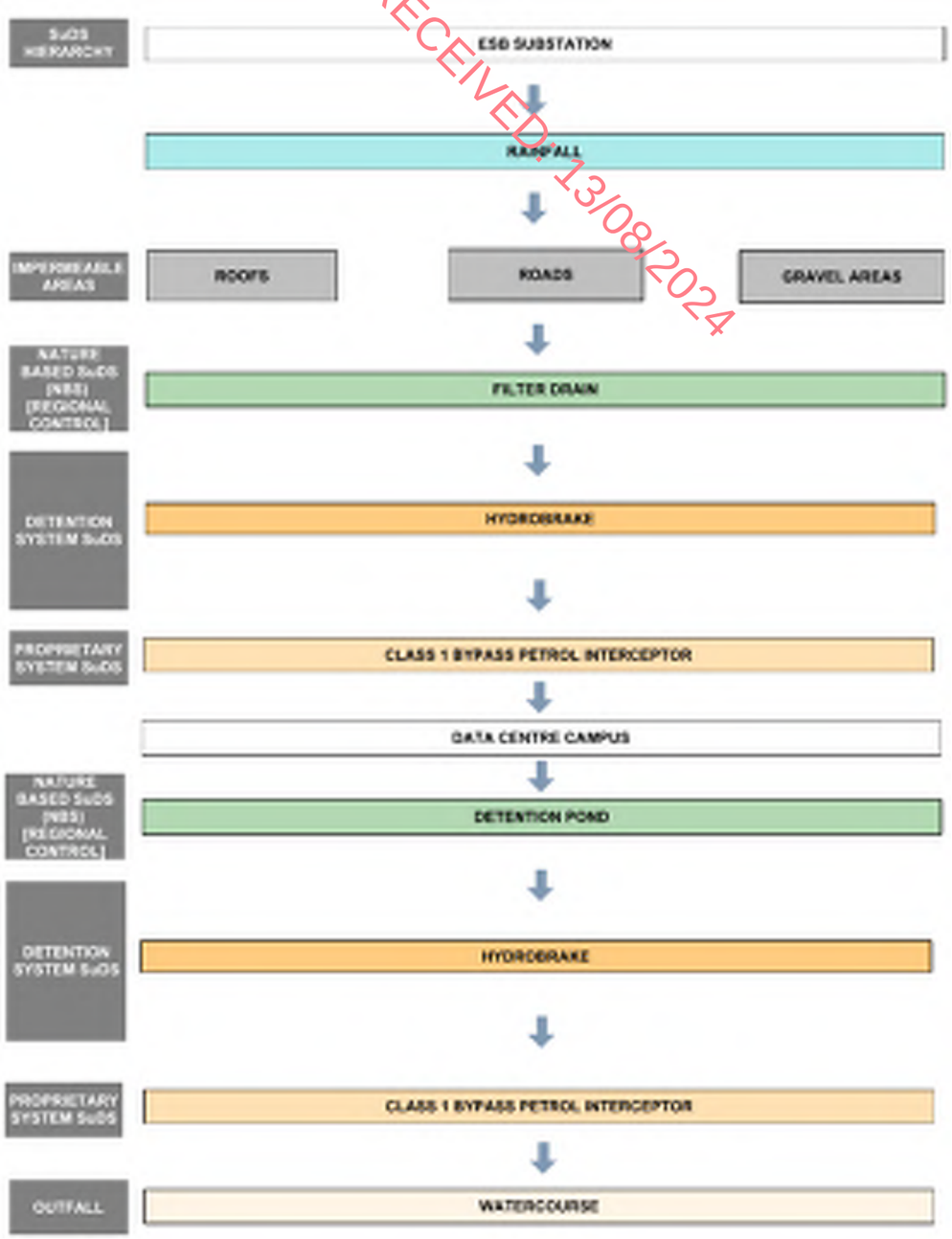
Figure 4-5. SuDS Hierarchy of Features proposed for the development

Sustainable Urban Drainage System		Regional Control	Source Control	Site Control	Other	Proposed for the Scheme	Rationale for the provision or otherwise of proposed SuDS measures
#	**Nature Based SuDS (NBS)**						
1	Constructed Wetlands	●				N	
2	Retention Pond	●				N	
3	Bioretention Areas		●			N	
4	Bioswales		●			N	
5	Rain Gardens		●			N	
6	Blue-Green Roofs		●			N	
7	Green Walls		●			N	
8	Tree Pits		●			N	
	Infiltration System SuDS						
9	Unlined tree pits-trenches		●			N	
10	Unlined permeable paving		●			N	
11	Infiltration trenches		●			N	
	Filtration System SuDS						
12	Filter Drains		●			Y	Filter Drains are proposed as source control SuDS measures for this project and will supplement the proposed detention basins.
13	Filter Strips		●			N	
14	Lined Permeable Paving		●			N	
	Detention Systems SuDS						
15	Detention Basin			●		N	
16	Lined Underground Attenuation Tank			●		N	
17	Over-sized pipes			●		N	
	Proprietary Treatment Systems						
18	Petrol/ oil separators				●	Y	A Petrol/ oil interceptor is proposed to be placed prior to the discharge of surface water to the public surface water drainage network.
19	Rainwater Harvesting		●			N	

4.4.2 Proposed Treatment Strategy

The minimum 2 stage treatment strategy per sub-catchment proposed for the development and associated SuDS hierarchy is illustrated in Figure 4-6 below.

Figure 4-6. Proposed Treatment Train



4.5 Proposed SuDS Elements

The proposed SuDS Strategy & associated details are indicated on drawing 2232-DOB-ZZ-ZZ-DR-C-0250 and are described in detail below.

4.5.1 Filter Drains

Filter drains are shallow trenches filled with stone/gravel that create temporary subsurface storage for the attenuation, conveyance and filtration of surface water runoff. The stone may be contained in a simple trench lined with a geotextile, geomembrane or other impermeable liner, or within a more structural facility such as a concrete trough. Filter drains may be lined

(if required) or may allow infiltration depending on the suitability of the underlying soils and the protection they afford to the groundwater.

Filter drains can help reduce pollutant levels in runoff by filtering out fine sediments, metals, hydrocarbons and other pollutants. They can also encourage adsorption and biodegradation processes. With adequate structural protection, geocellular products can be used as an alternative to some of the stone where the component is designed principally for conveyance: they have a higher void ratio but limited treatment capacity, and are often used to provide additional storage zones for high return period flow events in conjunction with other treatment components or gravel layers in the trench.

Filter drains can replace conventional pipework as conveyance systems, and the use of adjacent filter strips or flow spreaders can remove the need for kerbs and gullies when systems are located adjacent to roads or highways. They work best when incorporated into a treatment train, and should be used in conjunction with other SuDS components to safely pass and store extreme storm flows.

Filter drains have been selected to be provided along the edge of the hardstanding areas to take direct discharge from the road surface and from the roofs of the buildings on the site to convey water runoff from the site. The filter drains will also provide interception storage by placing the outlet above the base of the trench and attenuation storage for extreme events.

4.5.2 Proprietary Surface Water Treatment System

Proposed Class 1 bypass petrol interceptors shall be incorporated into the drainage system to intercept run-off and improve the quality of surface water discharging into the receiving system in compliance with best drainage practice and SuDS requirements. The interceptors shall serve to provide interception of run-off and deliver removal efficiency rates of up to 80% for suspended solids and hydrocarbons. The interceptors are proposed for use within the basement surface water drainage system.

4.6 Proposed SuDS Features & Associated Management/ Maintenance

The following section of the report addresses the maintenance requirements for the proposed SuDS features to be used on the Substation site in accordance with the guidance given in the CIRIA SuDS Manual. None of the drainage infrastructure on the site is proposed to be taken in charge and will be maintained by the operator pf the Substation.

4.6.1 Filtration System SuDS

Filter Drains (Source Control)

Table 4-2. Operation and maintenance requirements for filter Drains

Maintennace Schedule	Required Action	Typica Frequency
Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices.	Monthly (or as required)
	Inspect filter dain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage.	Monthly
	Inspect pre-tratment systems, inlets and perforated pipework for silt accumulation and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional Maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required

Petrol/Oil Seperators

Table 4-3. An example of Operation and maintenance requirements for a proprieatery treatmemt system

Maintennace Schedule	Required Action	Typica Frequency
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately followingsigniificat spill
Remidial Actions	Replace malfunctioning parts of structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter for media and estabilsh appropriate reapcement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

4.7 Proposed Design of Sustainable Drainage System

The design of sustainable drainage systems, as per Chapter 6 of the Greater Dublin Strategic Drainage Study (GDSDS), is set out below and describes the performance of the proposed surface water drainage system when measured against the relevant GDSDS drainage criterion, namely

- Criterion 1 – River Quality Protection
- Criterion 2 – River Regime Protection
- Criterion 3 – Level of Service (flooding) for the Site
- Criterion 4 – River Flood Protection

The requirements of SuDS are typically addressed through the provision of

- Interception Storage
- Treatment Storage (not required if interception storage is provided)
- Attenuation Storage
- Long Term Storage (not required if growth factors are not applied to Qbar when designing attenuation storage)

In accordance with KCC WSD requirements, a Climate Change factor of 30% will be applied to the design of the surface water system.

4.7.1 River Quality Protection

Objective

Interception storage of at least 5mm, and preferably 10mm, of rainfall where run-off to the receiving water can be prevented.

Proposal

The 10mm rainfall event on site will be intercepted without discharging to the public system. The below is a summary of the interception storage provided per sub-catchment.

Table 4-4. Summary of drained areas

Area Description	Area (m^2)
Roofs	1,344
Hardstanding	1,881
Gravelled Area	2,775

Therefore, the total area draining to the discharging to the drainage system is 6,000m^2. The required interception storage volume to accommodate the 10mm rainfall event is therefore 6,000 x 0.01 = 60m^3

A summary of the interception volumes provided is as follows: -

- Filter Drain
  - 355m x 1.5m wide x 0.3m depth of interception with 40% voids stone = 64m^3

The total provided interception storage = 64m^3, while the total required interception storage is 60m^3. Therefore, the interception storage provided on the site for the 10mm event exceeds with the requirements of GDSDS and the River Quality Projection objective.

4.7.2 River Regime Protection

Objcetives

2.1 Discharge rate equal to 1-year Greenfield site peak runoff rate or 2 l/s/Ha, whichever, is the greater. Site critical duration storm to be used to assess attenuation volume.

2.2 Discharge rate equal to 1 in 100-year Greenfield site peak run off rate. Site critical duration storm to be used to assess attenuation storage volume.

Proposals

The surface water network has been designed to comply with these sub-criteria and prior to discharging to the existing Bluebell watercourse, the surface water runoff will be reduced to the existing total Greenfield runoff rate, Qbar, of 3.6l/s. In order to achieve this, it is proposed to limit the surface water runoff from the site via a proposed hydro brake flow control device fitted to the discharge manhole of each catchment. Site Qbar calculations are included in Appendix D.Level of Service (flooding) for the Site.

Objectives

- No flooding on site except where specifically planned flooding is approved. Summer design storm of 15 or 30 minutes are normally critical.
- No internal property flooding. Planned flood routing and temporary flood storage accommodation on site for short high intensity storms. Site critical duration events.
- No internal property flooding. Floor levels at least 500mm above Maximum River level and adjacent on-site storage retention.

No flooding of adjacent urban areas. Overland flooding managed within the development

Proposal

Engineering calculations included in Appendix D demonstrate that no pluvial out-of-manhole flooding of the proposed surface network occurs for storms up to and including a 1 in 100 Year plus 30% Climate Change. Therefore, no flooding of the site, internal properties or adjacent urban areas occurs. Pipe sizes and gradients have been designed to achieve self-cleansing velocities as per the requirements of the Building Regulations Part 'H'. The lowest proposed floor level is set at +83.00mOD which is a minimum of 500mm freeboard to the top of water level in the lowest attenuated flood level. In the event of a storm exceeding a 1:100 Year plus 30% Climate Change event and the outfall becoming block, a high-level overflow is provided. Engineering Calculations included in Appendix D demonstrate that no pluvial out-of-manhole flooding occurs when the outfall is set to the high level overflow level.

4.7.3 River Flood Protection

Objectives

- Long-term floodwater accommodated on site for development runoff volume is in excess of the Greenfield volume. Temporary flood storage drained by infiltration on a designated flooding area brought into operation by extreme flood events only. 100-year, 6-hour duration storm to be used for assessment of the additional volume of runoff.
- Infiltration storage provided equal in volume to long term storage and usually designed to operate fort all events.
- Maximum discharge rate of Qbar or 2 l/s/Ha, whichever is the greater, for all attenuation storage where separate long-term storage cannot be provided.

Proposals

As noted above, the proposed Qbar for the total site is 3.6 l/s and as the surface water run-off generated on site does not exceed Qbar there is no requirement for long-term storage to limit the impact on the receiving watercourse.

4.8 CIRIA SuDS Health & Safety Risk Assessment

A risk assessment appropriate to the planning stage design has been be carried out in accordance with good practice for attenuation ponds provided on the site. Consideration has been given to both authorised and unauthorised personnel accessing the site. Health & Safety mitigation measures associated with open waterbodies on the site that have been adapted include:

- Access for normal maintenance will be provided for site personnel and H&S mitigation will form part of site-specific training for maintenance/facility staff.
- Maximum water levels will only occur during periods of severe storms (1:30 to 1:100 years events) and water levels will dissipate at Qbar run off rates over an approximate 24-hour period to return the water levels to dry weather conditions. High level overflows will be provided so that top water levels for the 1:100 + climate change design scenarios are not exceeded.

4.9 Proposed Piped Surface Water Network Design Parameters

The surface water piped network and associated attenuation design calculations have been prepared using Infodrainage Network Design Computer software by Innovyze with the drainage parameters that can be found in Table 4-5 and Appendix D for full set of calculations. The proposed surface water drainage system has been designed in accordance with I.S. EN 12056: 2000 'Gravity Drainage Systems inside Buildings', I.S. EN 752: 2017 'Drain & Sewer Systems outside Buildings', 'The Greater Dublin Region Code of Practice for Drainage Works', the recommendations of the 'Greater Dublin Strategic Drainage Study', (GDSDS) and the Building Regulations Technical Guidance Document Part H applying the following parameters.

Table 4-5. Drainage Parameters

Surface water drainage design method	Modified Rational Method
Surface water drainage design method	1 in 5 year
Storm Return period (years)	3.6 l/s
Allowable outflow (l/s)	Up to and including a 1 in 100 Year + 30% CC
Flooding Period	848
Standard Annual Average Rainfall (SAAR) (mm)	
M5-60 rainfall depth (mm)	16.2
Ratio, r	0.287
Allowance for Climate Change (%)	30
Minimum self-cleansing velocity (m/s)	
Pipe roughness (mm)	0.75
Run-off coefficients	0.6
Gravelled areas	
External hardstanding areas	50%

4.10 Attenuation Design

As noted in section 4.3 above, the proposed surface water attenuation on the site shall be provided in a number of underground filter drains. Attenuation will be provided on site to cater for the 1 in 100 year + 30% climate change. The proposed attenuation volume provided for the site consists of 355m of 1.5m wide by 1m deep stone filled filter drains with 40% voids. The total attenuation volume provided is 213m3.

The results of the surface water attenuation design calculations prepared using the InfoDrainage Network Design Computer software by Innovyze, show a required attenuation volume of 130m3 for the 1 in 100 year + 30% climate change storm event. Therefore, the provided attenuation volume is greater than the required attenuation volume.

5 Foul Drainage

5.1 Proposed Foul Drainage Strategy

Foul effluent from the site will be low as there are limited facilities and staff on the site (1 W.C. and 1 kitchenette sink). The proposed foul strategy will be to provide a new local foul drainage network to collect effluent from the substation building and from the MV room gullies and discharge from the Substation site into the adjacent Herbata Data Centre foul drainage network which conveys flows to a pumping station located on the site and discharges, via a rising main to the existing public foul drainage network located in the L2030 road to the south of the site. The DC network has been designed with sufficient capacity to accept the effluent from the Substation and is the subject of a separate planning application to Kildare County Council.

The layout of the proposed foul drainage network is included on drawing 2232-DOB-ZZ-ZZ-DR-C-0350 included with this application.

5.2 Proposed Foul Network Design

The foul sewer network as shown on drawing 2232-DOB-ZZ-ZZ-DR-C-0350 has been designed in accordance with the principles and methods set out in Uisce Eireann's Code of Practice for Wastewater Infrastructure IW-CDS-5030-03 (Revision 1 – December 2017), IS EN 752 Drain & Sewer Systems outside Buildings, IS EN 12056 Gravity Drainage Systems inside Buildings and the Building Regulations Technical Guidance Document Part H Drainage & Wastewater.

The foul network shall convey effluent generated by the limited workforce present at the Substation. As noted in the pre-connection enquiry submitted to Uisce Eireann staff are not permanently present on the site. Occasional presence is required for maintenance and repair by a limited number of individuals. In order to conservatively estimate the impact of the development on the Uisce Eireann infrastructure an effluent flow has been calculated based on 2 permanent members of staff as follows:

No. of Staff on Site = 2

Waste Generated = 50 litres/person/day (Factory Equivalent)

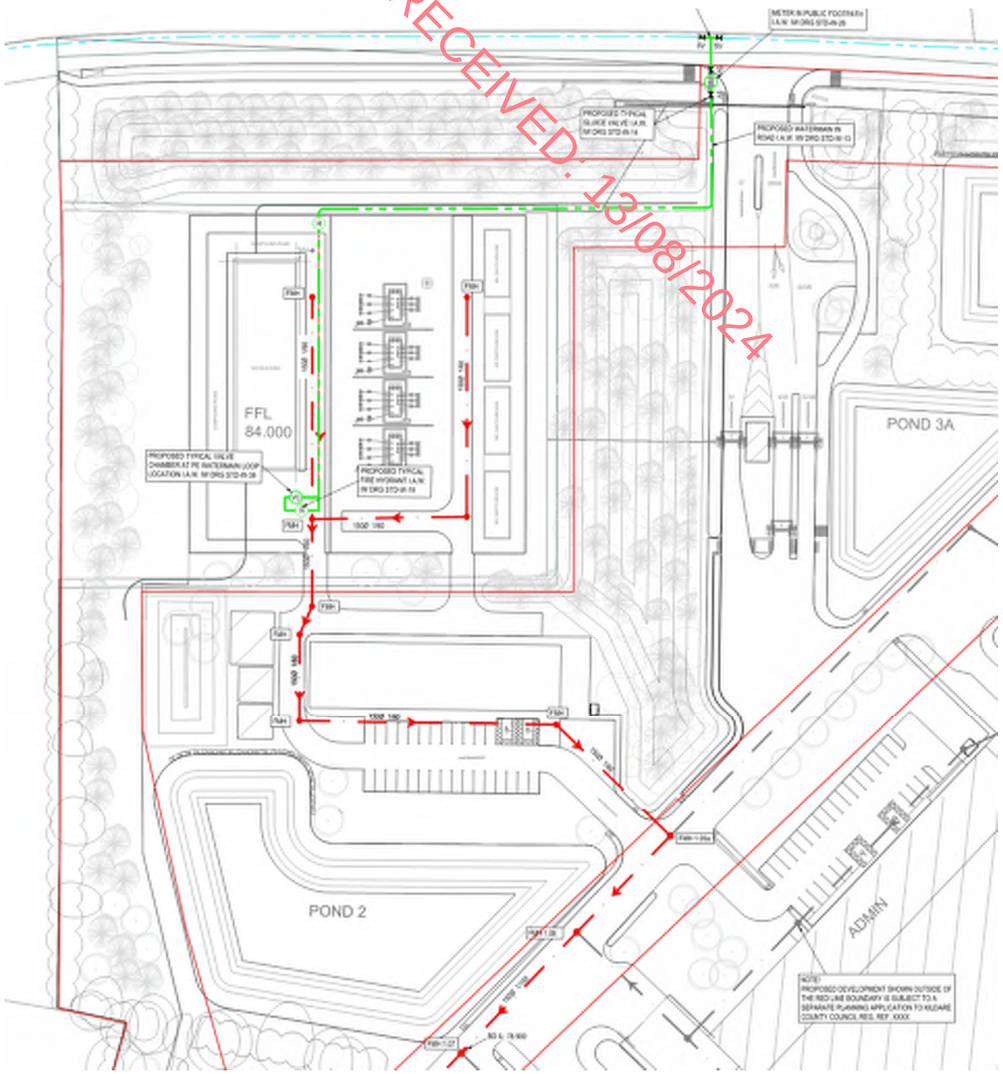
Total Daily Demand = 100 Litres

Assume 8 hour working day = 0.0035 litres/second

6 x D.W.F. = 0.021 litres/second

The effluent will discharge into the Data Centre Campus Infrastructure via a manhole at the perimeter of the Substation site. A pumped foul connection from the Data Centre Campus development shall be made via a rising main and stand-off manhole arrangement to the existing 300mm diameter public foul sewer, located to the south of the site along the L2030 (Newhall Road).

Figure 5-1. Foul Drainage Layout



5.3 Consultations with Uisce Eireann (Formally Uisce Eireann)

A pre-connection enquiry has been submitted to Uisce Eireann outlining the proposed strategy. Uisce Eireann have issued a Confirmation of Feasibility (CoF) for the proposed development (see Appendix E). The Confirmation of Feasibility response has noted that a new wastewater connection can be facilitated, without any upgrades to the existing public infrastructure.

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6 Water Supply

6.1 Proposed Water Supply Strategy

As noted in Section 5.1 above, there will be limited use of the proposed development from a staffing perspective and therefore water demand will be low. It is proposed that the substation development will be served by an independent water supply taken from the existing 225mm watermain that runs along the R409. A new metered 100mm connection will be provided for the development in order to serve the potable and firefighting demand of the substation.

Refer to engineering drawing 2232-DOB-ZZ-ZZ-DR-C-0350 for the proposed watermain layout.

6.1.1 Portable Water Supply

A new dedicated water supply is proposed to be taken from the existing 225mm dia. public water supply located along the R409 to serve the potable water supply demands of the site. As noted in section 5 the water demand will be infrequent and occasional. The estimated average hour water demand and peak hour water demand generated by the proposed development are 0.003125l/s and 0.039l/s respectively as calculated below in accordance with Uisce Eireann Code of Practice for Water.

No. of Staff on Site = 2

Water Demand = 45 litres/person/day (Factory Equivalent)

Total Daily Demand = 90 litres

Assume 8 hour working day = 0.003125 litres/second (Average Daily Domestic Demand)

1.25 X ADDD = 0.039 litres/second (Average Day / Peak Week Demand)

5.0 X AD/PW = 0.0195 litres/second (Peak Hour Water Demand)

6.1.2 Firefighting Water

The recommended firefighting water demand purposes for the proposed site is 20l/sec based on industrial site of less than 1 ha. Taken from the ‘National Guidance Document on the Supply of Water for Fighting Fire’ – Appendix .5. A hydrant will be located proximate to the Substation development that is fed by the Data Centre campus infrastructure.

6.2 Consultations with Uisce Eireann

A pre-connection enquiry has been submitted to Uisce Eireann outlining the proposed strategy. Uisce Eireann have issued a Confirmation of Feasibility (CoF) for the proposed development (see Appendix E). The Confirmation of Feasibility response has noted that a new wastewater connection can be facilitated, without any upgrades to the existing public infrastructure.

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7 Roads Infrastructure & Transport

7.1 Existing Road Infrastructure

The existing site is bound to the north by a public road (R409). This road provides access to residents along the R409 as well as providing access to the Osberstown Business Park. There is no existing direct access to the site of the proposed Substation currently.

7.2 Proposed Road Infrastructure and Access

The proposed access to the Substation site will be via the adjacent Herbata Data Centre Campus which is the subject of a separate planning application with Kildare County Council. The proposed access arrangements are indicated on drawing number 10360452-HDR-XX-XX-DR-C-112250. The internal roads within the Data Centre development are to remain private and will be maintained by the Data Centre management company.

The internal roads within the substation development are for occasional access of work vehicles only. Adequate roadway has been provided for fire tender access around the new substation building and within the adjacent MV room area for turning vehicles. A full Autotrack analysis has been undertaken for the site access road and the internal roads and is included on drawings 10360452-HDR-XX-XX-DR-C-112330, 10360452-HDR-XX-XX-DR-C-112340, 10360452-HDR-XX-XX-DR-C-112370, 10360452-HDR-XX-XX-DR-C-112380.

7.3 Parking

Due to the nature of the development, there is no requirement for formal parking at the site. Incoming traffic will be limited to occasional access by work vehicles. There is adequate space provided in the hardstanding area to the south of the new building for vehicles to park.

It is not considered necessary, due to the nature of the development and the occasional access for works and maintenance only, that cycle parking be provided.

Appendix 4.12 A
Drawing Register

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Appendix A. Register of Drawings Accompanying Application

HERBATA_Jigginstown_SID Docs & Dwg

	#	File Type	Size	Scale/Qty	DWG's Title	DWG's No	DS2.3 - Planning	DS2.2 - Planning
1								
2					Task Information Delivery Plan (TIDP) - Docs & DWGs Register Doc No. : 10360452-HDR-XX-XX-RG-M-000002	HDR Project No : 10360452	Stage 2 Issue - Planning	
3					Project Title : HERBATA Jigginstown	Design Stage	DS2	
4					SID	Issue No	2	
5					Discipline : 01_CIVIL & 03_CIVIL SUB-CON	*Date:*	06/06/24	
6	#	File Type	Size	Scale	DWG's Title & Categories	Rev No		
7	TOTAL		Qty	2	DISCIPLINE : 01_CIVIL	Issued DWG's Qty's	10	
8	5	File Type	Qty	0	HIGHWAYS AND EXTERNALS		5	
9		PDF	A0	1:1000	CAMPUS ROAD LAYOUT	10360452-HDR-XX-XX-DR-C-112250	P08	
10		PDF	A0	1:1000	SWEPT PATH ANALYSIS RIGID VEHICLE	10360452-HDR-XX-XX-DR-C-112330	P05	
11		PDF	A0	1:1000	SWEPT PATH ANALYSIS FIRE TENDER	10360452-HDR-XX-XX-DR-C-112340	P05	
12		PDF	A0	1:1000	SWEPT PATH ANALYSIS 500TON CRANE	10360452-HDR-XX-XX-DR-C-112370	P05	
13		PDF	A0	1:1000	SWEPT PATH ANALYSIS LOW LOADER TRANSPORTER VEHICLE	10360452-HDR-XX-XX-DR-C-112380	P05	
14	5	File Type	Qty	0	HIGHWAYS AND EXTERNALS		3	
15		PDF	A0	NTS	TYPICAL NEW LINE/CABLE INTERFACE TOWER DETAILS	10360452-HDR-XX-XX-DR-E-611000	P02	
16		PDF	A0	AS SHOWN	SUBSTATION COMPOUND SCHEMATIC LAYOUT & SECTIONS	10360452-HDR-XX-XX-DR-E-611001	P05	
17		PDF	A0	1:1000	EXISTING PYLONS TO BE REMOVED / REPLACED	10360452-HDR-XX-XX-DR-E-611002	P02	
18	5	File Type	Qty	2	GAS		1	
19	PDF	A0	A0	AS SHOWN	AGI & GNI COMPOUND SCHEMATIC LAYOUT & SECTIONS	10360452-HDR-XX-XX-DR-C-082110	P09	
20	7	File Type	Qty	0	FUEL SUPPLY		1	
21		PDF	A1	1:50	FUEL SUPPLY COMPOUND LAYOUT AND SECTIONS	10360452-HDR-XX-XX-DR-C-082190	P10	
22	TOTAL		Qty	0	DISCIPLINE : 01_CIVIL SUB-CON	Issued DWG's Qty's	3	
23	1	File Type	Qty	0	INFRASTRUCTURE DRAWINGS		3	
24		PDF	A0	AS SHOWN	PROPOSED TYPICAL DRAINAGE DETAILS SID AREA	2232-DOB-ZZ-ZZ-DR-C-1001	P05	
25		PDF	A0	AS SHOWN	PROPOSED SURFACE WATER DRAINAGE - SID AREA	2232-DOB-ZZ-ZZ-DR-C-0250	P09	
26		PDF	A0	AS SHOWN	PROPOSED FOUL & WATERMAIN LAYOUT - SID AREA	2232-D0B-ZZ-ZZ-DR-C-0350	P09	
27	#	File Type	Size	Scale	Doc's Title	Rev No		
28	TOTAL		Qty	0	DISCIPLINE : 01_CIVIL	Issued DWG's Qty's	0	
29	1	File Type	Qty	0	REPORTS		2	
30		PDF	A4	N/A	ENGINEERING PLANNING REPORT ESB SUBSTATIONS S.I.D	10360452-HDR-XX-00-RP-C-090001	P03	
31		PDF	A4	N/A	110KV GRID SUBSTATION AND TRANSMISSION LINE REPORT	10360452-HDR-XX-XX-RP-E-000001	P02	
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