5.3.3 Surface water discharge from the subject site:

Due to the increase in hard standing area as a result of the proposed development, there is an increased likelihood of surface water discharge from the site leading to downstream flooding. As such, the likelihood can be considered moderate.

5.3.4 Overland flooding from surrounding areas:

With no recorded flood events in the immediate area that could have an impact on the subject site, as per the OPW records referred to above, it is considered that there is a low likelihood of flooding from surrounding areas.

5.3.5 Overland flooding from the subject site:

Due to the increase in hard standing area as a result of the proposed development, there is an increased likelihood of overland flooding from the site leading to downstream flooding. As such, the likelihood can be considered moderate.

5.4 Consequence

Surface water flooding would result in damage to roads and landscaped areas, and could impact the basements and ground floor levels of buildings. The consequences of pluvial flooding are considered moderate.

5.5 Risk

The risk of each of the 5 pathway types is addressed individually as follows:

5.5.1 Surcharging of the proposed on-site drainage systems:

With a high likelihood and moderate consequence of flooding the site from surcharging the on-site drainage system, the resultant risk is high.

5.5.2 Surcharging from the existing surrounding drainage system:

With a low likelihood and moderate consequence of flooding the site from the existing surface water network, the resultant risk is low.

5.5.3 Surface water discharge from the subject site:

With a moderate likelihood and moderate consequence of surface water discharge from the subject site, the resultant risk is moderate.

5.5.4 Overland flooding from surrounding areas:

With a low likelihood and moderate consequence of overland flooding from the surrounding areas, the resultant risk is low.

5.5.5 Overland flooding from the subject site:

With a moderate likelihood and moderate consequence of overland flooding from the subject site, the resultant risk is moderate.

5.6 Flood Risk Management

The following are flood risk management strategies proposed to minimise the risk of pluvial flooding for each risk:

5.6.1 Surcharging of the proposed on-site drainage systems:

The risk of flooding is minimised with adequate sizing of the on-site surface water network and SuDS devices. Open grassed areas with low level planting and roadside trees act as soft scape and will significantly slow down and reduce the amount of surface water runoff from the site. Permeable paving at parking bays and private pathways will provide some treatment volume, with underlying perforated pipes connecting to the storm water sewer network. Green roofing will help to slow the runoff rate.

These proposed source and site control devices will intercept and slow down the rate of runoff from the site to the on-site drainage system, reducing the risk of surcharging.

Furthermore, a hydro-brake or similar approved flow control device will provide a runoff limited to the greenfield equivalent runoff rate, with excess storm water to be attenuated in an underground tank at the north-east of the site, with sufficient volume for the 1-in-100 year storm (accounting for a 20% increase due to climate change), to limit the runoff from the site and minimise the discharge rate into receiving waters.

As a result of these proposed measures, the likelihood of surcharging of the proposed on-site drainage systems is low.

5.6.2 Surcharging from the existing surrounding drainage system:

The risk of flooding due to surcharging of the existing surface water network is minimised with overland flood routing towards the open space at the east of the site.

The risk to the surrounding buildings is mitigated by setting finished floor levels at least 200mm above the adjacent road channel line.

5.6.3 Surface water discharge from the subject site:

Surface water discharge from the subject site is intercepted and slowed down through the use of source control devices, as described in Section 4.6.1 above, minimising the risk of pluvial flooding from the subject site. Surface water discharge from the site is restricted by a flow control device to the greenfield equivalent rate, with sufficient attenuation storage provided for the 1-in-100 year storm, accounting for a 20% increase due to climate change. As such, the rate at which surface water discharges from the subject site will not be increased as a result of the proposed development.

5.6.4 Overland flooding from surrounding areas:

The risk from overland flooding from surrounding areas is low. Overland flood routing and raised finished floor levels will provide protection for the proposed buildings, as described in Section 4.6.2 above. The proposed basement will be suitably tanked to prevent ingress of water.

5.6.5 Overland flooding from the subject site:

The risk of overland flooding from the subject site is minimised by providing SuDS features to intercept and slow down the rate of runoff from the site to the existing surface water sewer system, as described in Section 4.6.1 above. Sufficient attenuation is provided for the 1-in-100 year storm, accounting for a 20% increase due to climate change. Thus, even under extreme storm conditions, the surface water can be attenuated without causing flooding downstream.

5.7 Residual Risk

As a result of the design measures detailed above in Section 4.6, there is a low residual risk of flooding from each of the surface water risks.

6. Combined Pluvial and Fluvial

6.1 Source

Given that surface water from the proposed development will discharge to the Naniken River, there is a risk that during an extreme rainfall event the river level will rise enough that no surface water discharges from the site. It is therefore appropriate to consider the flood implications of an extreme rainfall event with little or no discharge.

6.2 Pathway

The pathway for a combined pluvial and fluvial event would be from surcharging of the proposed internal drainage system from the outfall surcharging back towards the site.

6.3 Receptor

The receptor for a combined pluvial and fluvial event would be St. Anne's Park along the drainage outfall (adjacent to pitch 3) and areas within the development from manholes surcharging.

6.4 Likelihood

Attenuation calculations carried out as part of the accompanying Engineering Assessment Report, and included in Appendix C of that report, identified the 12-hour 1-in-100-year storm as the critical storm.

This storm will generate 2,260.5m^3 of storm water runoff. Under typical circumstances, the discharge from the site over that 12-hour period would be 741.7m^3, via the proposed outfall to the Naniken River, with sufficient attenuation provided for the remaining 1,518.9m^3. However, if the river's water level were to significantly raise, such that no surface water could discharge from the site, the volume of rainwater would exceed the attenuation capacity of the development.

The surface water outfall to the Naniken River is proposed at an invert level of 18.64m OD Malin, with the typical water level in the river below this level. The outlet from the proposed attenuation has an invert level of 19.78m OD Malin, providing a hydraulic head of more than 1m between the attenuation and the outfall. Event during a storm event, the river's water level would need to rise significantly before surface water from the site would be unable to discharge. Thus, the likelihood is considered low.

6.5 Consequence

Surface water flooding would result in damage to roads and landscaped areas, and could impact the basements and ground floor levels of buildings. The consequences of a combined fluvial and pluvial flood event are considered moderate.

6.6 Risk

With a low likelihood and moderate consequences, the risk is considered moderate.

6.7 Flood Risk Management

An overprovision of attenuation storage is provided at the site. The required attenuation storage is to be provided in a detention basin with a below ground storage tank located in the open space between Blocks D and F, south of Block E. The detention basin has a volume of 340m^3, while the underlying attenuation tank has a volume of 1,620m^3, for a total storage volume of 1,960m^3, which exceeds the required volume of 1,518.9m^3.

The surface water outfall to the Naniken River is proposed at an invert level of 18.64m OD Malin. The previous manhole before the outfall has a cover level of 20.15m OD Malin, and the north-east corner of the site is at 21.76m OD Malin. Thus, if the entire attenuation provision were to fill and the surface water network begins to surcharge, the pipework and manholes can hold a significant volume of storm water before surcharging as far as the surface level. The approximately 800m of surface water drains, ranging in diameter from 225mm to 450mm, can provide approximately 52m^3 of additional storage in an extreme combined storm event, with the 30 no. proposed surface water manholes providing approximately an additional 64m^3 before storm water reaches the surface level.

Under these extreme circumstances, the level of the water in the drainage network would likely ensure some discharge to the Naniken River, whose water level is typically more than 3.5m below most of the subject site. A non-return valve is proposed at the Hydrobrake manhole to ensure no backflow of surface water to the site.

In the highly unlikely event that there is no discharge to the Naniken River whatsoever throughout the entirety of the 12-hour 1-in-100-year critical storm event, any storm water over and above the 1,960m^3 of attenuation and approximately 116m^3 of volume within the sewers and manholes would surcharge and overflow through gullies and manhole lids. The consequences of flooding due to surcharging of the existing surface water network is minimised with overland flood routing towards the open space at the east of the site. Along the route of the outfall sewer, the land falls towards the Naniken River so overland flood routing within the park would be towards the river.

6.8 Residual Risk

There is a low residual risk of flooding from a combined pluvial and fluvial event.

7. Groundwater

7.1 Source

Groundwater flooding occurs when the water table rises above the ground surface. This typically happens during periods with prolonged rainfall which exceeds the natural underground drainage system's capacity.

7.2 Pathway

The pathway for groundwater flooding is from the ground. Note that although groundwater flooding is typically considered to be when the water table rises above the ground surface, the basements, underground services and building foundations could also be affected by high water tables that do not reach the ground surface.

7.3 Receptor

The receptors for ground water flooding would be the basements, underground services and the ground floor of buildings.

7.4 Likelihood

Geological Survey Ireland (GSI) produces a wide range of datasets, including groundwater vulnerability mapping. From the GSI groundwater vulnerability map, extracted below, the site lies within an area with low groundwater vulnerability.

***Figure 6** | Extract of Groundwater Vulnerability Map*

With the site falling within an area with low groundwater vulnerability, the likelihood of groundwater rising through the ground and causing potential flooding on site during prolonged wet periods is low.

7.5 Consequence

The consequence of ground water flooding would be some minor temporary seepage of ground water through the ground around the proposed buildings. Underground services could be inundated from high water tables. Over time, groundwater could seep into the basement. Therefore, the consequence of ground water flooding occurring at the proposed development is considered moderate.

7.6 Risk

With a low likelihood and moderate consequences of flooding due to groundwater, the risk is considered low.

7.7 Flood Risk Management

Finished floor levels have been set above the road levels, as described in Section 4.6. This will ensure that any ground water in the vicinity of the building does not flood into the building.

The buildings' design will incorporate suitable damp proof membranes to protect against damp and water ingress from below ground level. To mitigate the risks of groundwater entering the basements they must be adequately waterproofed. Any penetrations through either of the basement's walls or slab must also be appropriately sealed to prevent ingress of groundwater.

It is proposed to install a granular blanket surrounding the basement structure, which will allow groundwater to seep around the basement, maintaining any long-term sub-surface perched water movement. This will minimise the effect that the proposed basement will have on the local water table, mitigating the risk to surrounding areas including other basements in the vicinity of the site.

In the event of ground water flooding on site, this water can escape from the site via the overland flood routing, as described in Section 4.6.

7.8 Residual Risk

There is a low residual risk of flooding from ground water.

8. Human/Mechanical Errors

8.1 Source

The subject site will be drained by an internal private storm water drainage system outfalling to the Naniken River. The internal surface water network is a source of possible flooding were it to become blocked.

8.2 Pathway

If the public drainage network in the vicinity of the site were to block this could lead to possible flooding within the private areas and basement levels. If the proposed internal drainage system blocks this could also lead to possible flooding within the private areas and basement levels.

8.3 Receptor

The receptors for flooding due to human/mechanical error would be the ground floor and basements of the buildings, with possible flooding at neighbouring buildings.

8.4 Likelihood

There is a high likelihood of flooding on the subject site if the surface water network were to become blocked.

8.5 Consequence

The surface water network would surcharge and overflow through gullies and manhole lids. It is, therefore, considered that the consequences of such flooding are moderate.

8.6 Risk

With a high likelihood and moderate consequence, there is a high risk of surface water flooding should the surface water network block.

8.7 Flood Risk Management

As described in Section 4.6, finished floor levels have been designed to be above the adjacent road network which will reduce the risk of flooding if the public surface water network (combined network) were to block. In the event of the surface water system surcharging, much of the surface water can still escape from the site by overland flood routing, as described in Section 4.6, without causing damage to the proposed buildings.

The surface water network (drains, gullies, manholes, AJs, attenuation system) will need to be regularly maintained and where required cleaned out. A suitable maintenance regime of inspection and cleaning should be incorporated into the safety file/maintenance manual for the development.

8.8 Residual Risk

As a result of the flood risk management outlined above, there is a low residual risk of overland flooding from human / mechanical error.

9. Conclusions and Recommendations

The subject lands have been analysed for risks from tidal flooding from the Irish Sea, fluvial flooding from the Naniken River and the Santry River, pluvial flooding, ground water and failures of mechanical systems. The table below presents the various residual flood risks involved:

Source	Pathway	Receptor	Likelihood	Consequence	Risk	Mitigation Measure	Residual Risk
Tidal	*Dublin Bay, west of North Bull Island*	*Proposed development*	*Extremely low*	*None*	*Negligible*	*None*	Extremely low
Fluvial	*Naniken and Santry Rivers*	*Proposed development*	*Extremely low*	*None*	*Negligible*	*None*	Extremely low
Pluvial	*Private & Public Drainage Network*	*Proposed development, downstream properties and roads*	*Ranges from low to high*	*High*	*Ranges from moderate to extremely high*	*Appropriate drainage, SuDS and attenuation design, setting of floor levels, overland flood routing*	Low
Combined fluvial and pluvial event	*Sewers surcharging due to minimal discharge to Naniken River*	*St. Anne's Park, proposed development*	*Low*	*Moderate*	*Moderate*	*Overprovision of attenuation, additional volume in surcharged pipes and manholes, non-return valve, overland flood routing*	Low
Ground Water	*Ground*	*Underground services, ground and basement levels of buildings*	*Low*	*Moderate*	*Low*	*Appropriate setting of floor levels, flood routing, damp proof membranes*	Low
Human/ Mechanical Error	*Drainage network*	*Proposed development*	*High*	*Moderate*	*High*	*Setting of floor levels, overland flood routing, regular inspection of SW network*	Low

***Table 7** | Summary of the Flood Risks from the Various Components*

As indicated in the above table, the various sources of flooding have been reviewed, and the risk of flooding from each source has been assessed. Where necessary, mitigation measures have been proposed. As a result of the proposed mitigation measures, the residual risk of flooding from any source is low.

UK and Ireland Office Locations

Appendix M GoCar Letter of Intent

Marlet Property Group
O'Connell Bridge House,
27/28 D'Olier Street,
Dublin 2
D02 RR99

01/07/2022

To Whom It May Concern,

This is a letter to confirm that GoCar intends to provide a car sharing service in the proposed development at Foxlands in Raheny, Dublin 5. GoCar representatives have discussed the project with representatives of Waterman Moylan, who are the Design engineers for this project and are excited to provide a car sharing service at the proposed location. GoCar would provide two (2) car sharing vehicles at the 581 residential unit development. While it is the intention for these vehicles to be used primarily by the residents of the development, the vehicles will be open for access to other GoCar members nearby.

GoCar is Ireland's leading car sharing service with over 60,000 members and over 860 cars and vans on fleet.
Car sharing is a sustainable community service. Each GoCar which is placed in a community has the potential to replace the journeys of up to 15 private vehicles. With the addition of Electric Vehicles and vans to the GoCar fleet it gives members the ability to choose from different vehicles depending on their journey needs.

The Department of Housing's Design Standards for New Apartments - Guidelines for Planning Authorities 2020 outline: "For all types of location, where it is sought to eliminate or reduce car parking provision, it is necessary to ensure... provision is also to be made for alternative mobility solutions including facilities for car sharing club vehicles."

By allowing multiple people to use the same vehicle at different times, car sharing reduces car ownership, car dependency, congestion, noise, and air pollution. It frees up land which would otherwise be used for additional parking spaces. Most GoCar users only use a car when necessary and walk and use public transport more often than car owners.

By having GoCar car sharing vehicles in a development such as this, the residents therein will have access to pay-as-you-go driving, in close proximity to their homes, which will increase usership of the service.

I trust that this information is satisfactory. For any queries, please do not hesitate to contact me.

Rob Montgomery
Revenue and Growth Manager
GoCar Carsharing Ltd
Mobile: 086 609 7096
E: robert.montgomery@gocar.ie

Appendix N TRIC Rates

Calculation Reference: AUDIT-561501-211102-1105

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
Category : C - FLATS PRIVATELY OWNED
TOTAL VEHICLES

Selected regions and areas:
15 GREATER DUBLIN
DL DUBLIN 1 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Primary Filtering selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter: Total Bedrooms
Actual Range: 725 to 725 (units:)
Range Selected by User: 400 to 1080 (units:)

Parking Spaces Range: All Surveys Included

Parking Spaces per Dwelling Range: All Surveys Included

Bedrooms per Dwelling Range: All Surveys Included

Percentage of dwellings privately owned: All Surveys Included

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/13 to 23/10/20

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:
Friday 1 days

This data displays the number of selected surveys by day of the week.

Selected survey types:
Manual count 1 days
Directional ATC Count 0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaking using machines.

Selected Locations:
Suburban Area (PPS6 Out of Centre) 1

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:
Residential Zone 1

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Secondary Filtering selection:

Use Class:
C3 1 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Population within 500m Range:
All Surveys Included
Population within 1 mile:
25,001 to 50,000 1 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:
500,001 or More 1 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:
0.6 to 1.0 1 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:
No 1 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

PTAL Rating:
No PTAL Present 1 days

This data displays the number of selected surveys with PTAL Ratings.

Covid-19 Restrictions	Yes	At least one survey within the selected data set was undertaken at a time of Covid-19 restrictions

LIST OF SITES relevant to selection parameters

1 **DL-03-C-17** **BLOCKS OF FLATS** **DUBLIN**
FINGLAS ROAD
DUBLIN
FINGLAS
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total Total Bedrooms: 725
Survey date: FRIDAY *23/10/20* *Survey Type: MANUAL*

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
TOTAL VEHICLES
Calculation factor: 1 TOTBED
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. TOTBED	Trip Rate	No. Days	Ave. TOTBED	Trip Rate	No. Days	Ave. TOTBED	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	1	725	0.022	1	725	0.066	1	725	0.088
08:00 - 09:00	1	725	0.044	**1**	**725**	**0.124**	**1**	**725**	**0.168**
09:00 - 10:00	1	725	0.052	1	725	0.022	1	725	0.074
10:00 - 11:00	1	725	0.025	1	725	0.025	1	725	0.050
11:00 - 12:00	1	725	0.025	1	725	0.037	1	725	0.062
12:00 - 13:00	1	725	0.026	1	725	0.033	1	725	0.059
13:00 - 14:00	1	725	0.054	1	725	0.057	1	725	0.111
14:00 - 15:00	1	725	0.069	1	725	0.057	1	725	0.126
15:00 - 16:00	1	725	0.054	1	725	0.047	1	725	0.101
16:00 - 17:00	1	725	0.062	1	725	0.029	1	725	0.091
17:00 - 18:00	**1**	**725**	**0.083**	1	725	0.055	1	725	0.138
18:00 - 19:00	1	725	0.055	1	725	0.051	1	725	0.106
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.571			0.603			1.174

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

Parameter summary

Trip rate parameter range selected:	725 - 725 (units:)
Survey date date range:	01/01/13 - 23/10/20
Number of weekdays (Monday-Friday):	1
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED

CARS

Calculation factor: 1 TOTBED

BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. TOTBED	Trip Rate	No. Days	Ave. TOTBED	Trip Rate	No. Days	Ave. TOTBED	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	1	725	0.019	1	725	0.061	1	725	0.080
08:00 - 09:00	1	725	0.037	**1**	**725**	**0.109**	**1**	**725**	**0.146**
09:00 - 10:00	1	725	0.048	1	725	0.018	1	725	0.066
10:00 - 11:00	1	725	0.019	1	725	0.017	1	725	0.036
11:00 - 12:00	1	725	0.022	1	725	0.037	1	725	0.059
12:00 - 13:00	1	725	0.018	1	725	0.028	1	725	0.046
13:00 - 14:00	1	725	0.041	1	725	0.043	1	725	0.084
14:00 - 15:00	1	725	0.061	1	725	0.050	1	725	0.111
15:00 - 16:00	1	725	0.048	1	725	0.040	1	725	0.088
16:00 - 17:00	1	725	0.051	1	725	0.025	1	725	0.076
17:00 - 18:00	**1**	**725**	**0.073**	1	725	0.048	1	725	0.121
18:00 - 19:00	1	725	0.050	1	725	0.046	1	725	0.096
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.487			0.522			1.009

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

Calculation Reference: AUDIT-561501-211102-1138

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 05 - HEALTH
Category : F - CARE HOME (ELDERLY RESIDENTIAL)
TOTAL VEHICLES

Selected regions and areas:

12	**CONNAUGHT**		
	CS	SLIGO	1 days
15	**GREATER DUBLIN**		
	DL	DUBLIN	1 days
17	**ULSTER (NORTHERN IRELAND)**		
	DO	DOWN	1 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Primary Filtering selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter: Number of residents
Actual Range: 16 to 99 (units:)
Range Selected by User: 16 to 99 (units:)

Parking Spaces Range: All Surveys Included

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/13 to 05/09/17

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Monday	1 days
Tuesday	1 days
Saturday	1 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	3 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaking using machines.

Selected Locations:

Suburban Area (PPS6 Out of Centre)	1
Edge of Town	2

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

Residential Zone	3

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Secondary Filtering selection:

Use Class:

C2	3 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Population within 500m Range:

All Surveys Included

Population within 1 mile:

1,001 to 5,000	1 days
5,001 to 10,000	2 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

5,001 to 25,000	2 days
25,001 to 50,000	1 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

1.1 to 1.5	3 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

Yes	1 days
No	2 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

PTAL Rating:

No PTAL Present	3 days

This data displays the number of selected surveys with PTAL Ratings.

LIST OF SITES relevant to selection parameters

1	**CS-05-F-01**	**NURSING HOME**		**SLIGO**
	CHURCH HILL			
	SLIGO			
	Edge of Town			
	Residential Zone			
	Total Number of residents:		99	
	Survey date: MONDAY		*27/04/15*	*Survey Type: MANUAL*
2	**DL-05-F-01**	**NURSING HOME**		**DUBLIN**
	MOUNT ANVILLE PARK			
	DUBLIN			
	GOATSTOWN			
	Suburban Area (PPS6 Out of Centre)			
	Residential Zone			
	Total Number of residents:		16	
	Survey date: TUESDAY		*05/09/17*	*Survey Type: MANUAL*
3	**DO-05-F-01**	**CARE HOME**		**DOWN**
	STRANGFORD ROAD			
	DOWNPATRICK			
	Edge of Town			
	Residential Zone			
	Total Number of residents:		65	
	Survey date: SATURDAY		*20/06/15*	*Survey Type: MANUAL*

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.

TRIP RATE for Land Use 05 - HEALTH/F - CARE HOME (ELDERLY RESIDENTIAL)
TOTAL VEHICLES
Calculation factor: 1 RESIDE
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. RESIDE	Trip Rate	No. Days	Ave. RESIDE	Trip Rate	No. Days	Ave. RESIDE	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	3	60	0.283	3	60	0.061	3	60	0.344
08:00 - 09:00	3	60	0.094	3	60	0.144	3	60	0.238
09:00 - 10:00	3	60	0.122	3	60	0.056	3	60	0.178
10:00 - 11:00	3	60	0.233	3	60	0.122	3	60	0.355
11:00 - 12:00	3	60	0.172	3	60	0.156	3	60	0.328
12:00 - 13:00	3	60	0.083	3	60	0.189	3	60	0.272
13:00 - 14:00	3	60	0.217	3	60	0.178	3	60	0.395
14:00 - 15:00	3	60	0.194	**3**	**60**	**0.311**	3	60	0.505
15:00 - 16:00	3	60	0.183	3	60	0.139	3	60	0.322
16:00 - 17:00	3	60	0.094	3	60	0.200	3	60	0.294
17:00 - 18:00	3	60	0.089	3	60	0.139	3	60	0.228
18:00 - 19:00	3	60	0.083	3	60	0.150	3	60	0.233
19:00 - 20:00	**2**	**41**	**0.358**	2	41	0.247	**2**	**41**	**0.605**
20:00 - 21:00	2	41	0.049	2	41	0.210	2	41	0.259
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			2.254			2.302			4.556

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

Parameter summary

Trip rate parameter range selected:	16 - 99 (units:)
Survey date date range:	01/01/13 - 05/09/17
Number of weekdays (Monday-Friday):	2
Number of Saturdays:	1
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 05 - HEALTH/F - CARE HOME (ELDERLY RESIDENTIAL)
CARS
Calculation factor: 1 RESIDE
BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. RESIDE	Trip Rate	No. Days	Ave. RESIDE	Trip Rate	No. Days	Ave. RESIDE	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	3	60	0.272	3	60	0.050	3	60	0.322
08:00 - 09:00	3	60	0.078	3	60	0.128	3	60	0.206
09:00 - 10:00	3	60	0.100	3	60	0.033	3	60	0.133
10:00 - 11:00	3	60	0.211	3	60	0.106	3	60	0.317
11:00 - 12:00	3	60	0.122	3	60	0.106	3	60	0.228
12:00 - 13:00	3	60	0.072	3	60	0.178	3	60	0.250
13:00 - 14:00	3	60	0.194	3	60	0.156	3	60	0.350
14:00 - 15:00	3	60	0.172	**3**	**60**	**0.283**	3	60	0.455
15:00 - 16:00	3	60	0.172	3	60	0.139	3	60	0.311
16:00 - 17:00	3	60	0.089	3	60	0.189	3	60	0.278
17:00 - 18:00	3	60	0.078	3	60	0.122	3	60	0.200
18:00 - 19:00	3	60	0.083	3	60	0.150	3	60	0.233
19:00 - 20:00	**2**	**41**	**0.346**	2	41	0.235	**2**	**41**	**0.581**
20:00 - 21:00	2	41	0.037	2	41	0.198	2	41	0.235
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			2.026			2.073			4.099

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

Enviroguide CONSULTING

Appendix O Public Transport Assessment

Waterman Moylan
Engineering Consultants

Public Transport Capacity Assessment

Proposed Large Residential Development (LRD) at Foxlands, Raheny, Dublin 5

August 2022

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Waterman Moylan
Engineering Consultants

Client Name:	Raheny 3 Limited Partnership
Document Reference:	21-083r.008 Public Transport Capacity Assessment
Project Number:	21-083

Quality Assurance – Approval Status

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015 and BS EN ISO 14001: 2015)

Issue	Date	Prepared by	Checked by	Approved by
1	31 August 2022	Luke Byrne	Stephen Dent-Neville	Mark Dingman

Comments

Waterman Moylan
Engineering Consultants

Disclaimer

This report has been prepared by Waterman Moylan, with all reasonable skill, care and diligence within the terms of the Contract with the Client, incorporation of our General Terms and Condition of Business and taking account of the resources devoted to us by agreement with the Client.

We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above.

This report is confidential to the Client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at its own risk.

Contents

Figures

Tables

1. Introduction

1.1 Context

This Public Transport Capacity Assessment Report has been prepared by Waterman Moylan as part of the documentation in support of a planning application for a proposed Large Residential Development (LRD) at Foxlands in Raheny, Dublin 5.

1.2 Location

Raheny 3 Limited Partnership are applying for permission for development on lands east of St. Paul's College, Sybil Hill Road, Raheny, Dublin 5. The site is bounded to the north, east and south by St Anne's Park and to the west by residential development at The Meadows, Sybil Hill House (a Protected Structure) and St. Paul's College. Vehicular access to the site is from Sybil Hill Road.

The locations of the Dart Stations and bus stop surveyed as part of this report are indicated in Figure 1, below:

***Figure 1** | Location of the Development and Survey Locations*

1.3 Proposed Development

The proposed development consists of the construction of a residential and nursing home development set out in 7 no. blocks, ranging in height from 4 to 7 storeys to accommodate 580 no. apartments, residential

tenant amenity spaces, a crèche, and a 100-bed nursing home, as set out in the schedule of accommodation below:

Description		1-Bed	2-Bed	3-Bed	Total
Apartment Blocks	Block A	31	25	5	61
	Block B	44	26	-	70
	Block C	46	57	9	112
	Block D	56	58	22	136
	Block E	47	46	3	96
	Block F	23	9	4	36
Mixed-Use (Block G)	Apartments	25	27	17	69
	Nursing Home	100 Bedspaces			-
	Crèche	6 Classrooms			-
Total		**272**	**248**	**60**	**580**

Table 1 | *Schedule of Accommodation*

The site will accommodate car parking spaces, bicycle parking spaces, storage, services and plant areas at both basement and podium level. Landscaping will include extensive communal amenity areas, and a significant public open space provision on the east and south of the site. The proposed application includes all site landscaping works, green roofs, substations, boundary treatments, lighting, servicing, signage, surface water attenuation facilities and associated and ancillary works, including site development works and services above and below ground.

1.4 Survey at Foxlands, Raheny 2022

The bus capacity survey at Foxlands, Raheny was carried out by Waterman Moylan personnel on Monday 25th July 2022. The Bus Capacity Survey was for Bus Stop 606 heading towards Dublin City Centre, the busiest bus stop within the area.

1.5 Covid 19

It was not apparent from the survey observations described later in this report that the existing bus and train services that will serve the transport needs of the subject site are experiencing diminished patronage as a result of the impacts of Covid-19.

The additional demand for bus services that will be generated by the proposed development will result in very low increases in passenger volumes on the public transport services. At the same time, a full *"return to normal"* level of commuting, post-Covid, is unlikely.

2. Existing Bus Services – Foxlands, Raheny

The proposed development is served by four bus stops with the local area. The nearest bus stops are to the north of the development on R105 Howth Road. Bus Stop 709 is served by buses travelling away from the City Centre, including bus routes 6, H1, H2, H3 while Bus Stop 606 is served by buses travelling towards the City Centre, including bus routes 6, H1, H2, H3. Bus Stop 709 is approximately 400m (c. 5-minute walk) away from the proposed development entrance and Bus Stop 606 is 450m (c. 6-minute walk) away.

These Bus Services are part of the BusConnects Network, Phase 1 of which was launched in June 2021. Phase 1 is the first BusConnects scheme to launch and is for the H-Spine network. The H spine branches are the primary driver of the new network, delivering fast and frequent services to the city centre. Services on H1 (from Baldoyle), H2 (from Malahide) and H3 (from Howth) will provide greater levels of service to these residents and the surrounding communities.

There are two bus stops on Vernon Avenue; namely Bus Stop 7607 (c.6-minute walk) and Bus Stop 1651 (c. 7-minute walk). Both stops are served by the 104 Bus route (in opposite directions).

Bus No.	Route	Weekday Frequency	Saturday Frequency	Sunday Frequency
6	Howth Station towards Abbey Street Lower	30 - 60 mins	60 mins	60 mins
	Abbey Street Lower toward Howth Station	30 - 60 mins	60 mins	60 mins
H1	Baldoyle towards Abbey Street Lower	15 mins	20 mins	15 – 30 mins
	Abbey Street Lower towards Baldoyle	15 mins	20 mins	15 – 30 mins
H2	Malahide towards Abbey Street Lower	30 mins	40 mins	60 mins
	Abbey Street Lower towards Malahide	30 mins	40 mins	60 mins
H3	Howth Summit towards Abbey Street Lower	30 mins	40 mins	60 mins
	Abbey Street Lower towards Howth Summit	30 mins	40 mins	60 mins
104	Contraf Station towards DCU	60 mins	-	-
	DCU towards Clontraf Station	60 mins	-	-

***Table 2** | Existing Bus Routes*

Figure 2 | *Existing Bus Stop Locations*

3. Existing Rail Services - Harmonstown and Killester Dart Station

The proposed development is also in close proximity to two Dart Stations: Harmonstown Dart Station and Killester Dart Station. This provides access to several areas in North and South Dublin. It is approximately 800m (c. 10-minutes walking) from the proposed development to Harmonstown Dart Station and 950m (c. 12-minutes walking) to Killester Dart Station. Figure 4 below shows the location of the dart dation relative to the proposed development.

There are 3 bicycle parking spaces available at Killester Station and no bicycle parking spaces at Harmonstown.

Figure 3 | *Location of the nearest Dart Station*

3.1 Dart Expansion Programme

The DART+ Programme aims to improve current rail services across Dublin City and Greater Dublin, by modernising and providing an electrified and more frequent and reliable rail service, enhancing capacity on the rail corridor. As part of the programme, the rail service between Drogheda and Dublin City Centre (via Malahide) is planned to be electrified with higher frequency. New rail frequency on the Malahide line has not been confirmed at the time of writing, however, significant increase in capacity is expected by purchase of new rolling stock.

4. Existing Modal Split

A full breakdown of the population is required for the modal split of the surrounding areas. Census 2016 was carried out by the Central Statistics Office on 24th April 2016.

With the objective to obtain information regarding 'car ownership' and 'modal split for the journey to work, school or college', the existing residential areas surrounding the proposed development. For the purpose of the 2016 survey, these areas have been divided in 4 Areas. These consulted Small Areas are illustrated in Figure 4.

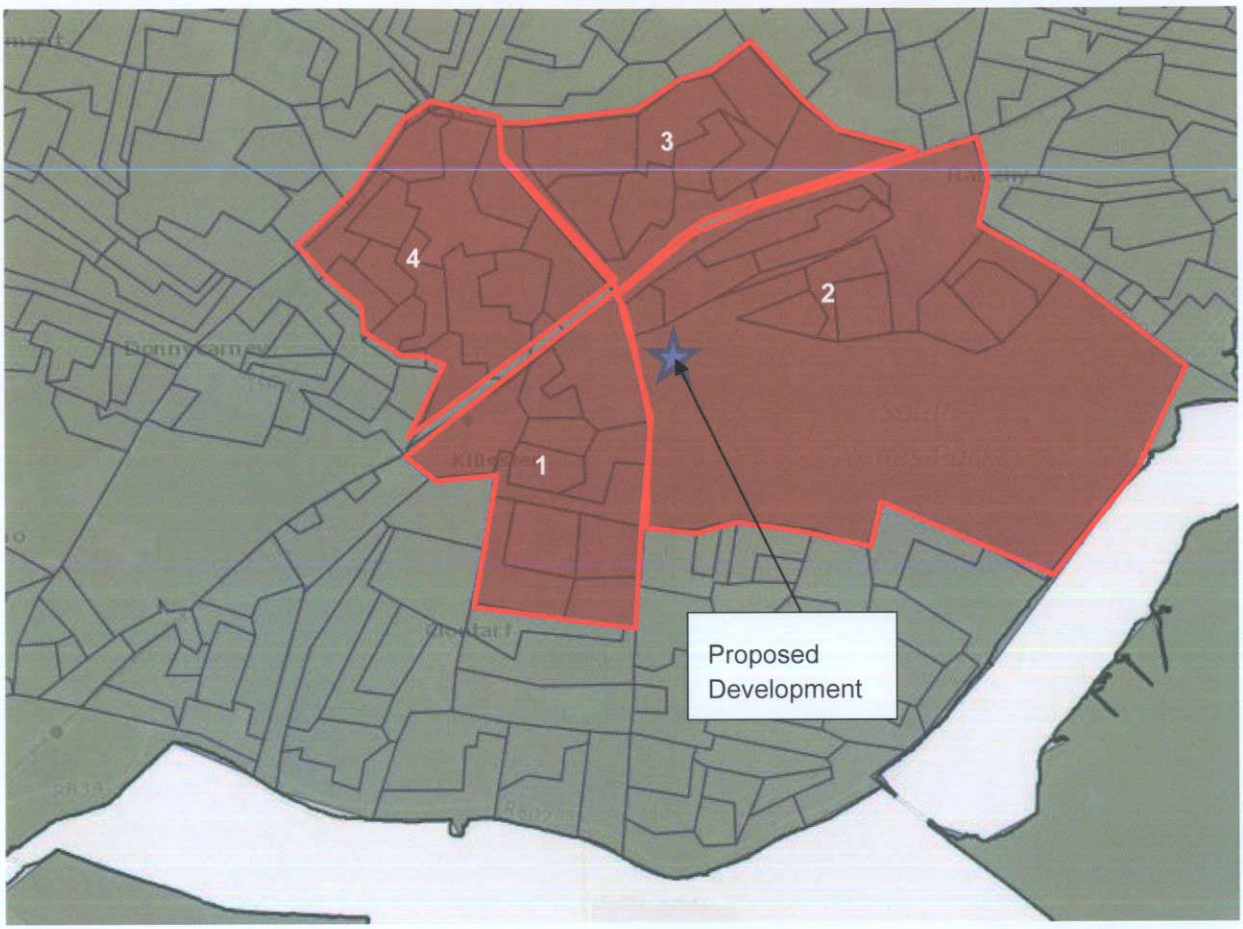


Figure 4 | *SapMap Areas*

The existing modal split for the journey to work by the residents at the Small Areas (Zones) as surveyed in Census 2016 is presented in Table 2

Area	*Pop.*	*Trip Attractor*	*Car Driver*	*Car Passenger*	*Train*	*Bus*	*Cycle*	*On Foot*	*Others or Not Stated*	*Total*
1	*2906*	*Work*	607	18	235	85	122	67	29	1163
			52%	2%	20%	7%	10%	6%	2%	100%
		College	17	187	76	77	58	206	5	626
			3%	30%	12%	12%	9%	33%	1%	100%
2	*3438*	*Work*	609	29	291	105	136	58	30	1258

			48%	2%	23%	8%	11%	5%	2%	100%
		College	20	152	77	110	47	328	10	744
			3%	20%	10%	15%	6%	44%	1%	100%
3	*3442*	*Work*	484	24	255	120	101	64	28	1076
			45%	2%	24%	11%	9%	6%	3%	100%
		College	12	155	52	89	51	220	19	598
			2%	26%	9%	15%	9%	37%	3%	100%
4	*2693*	*Work*	504	21	265	160	140	60	37	1187
			42%	2%	22%	13%	12%	5%	3%	100%
		College	13	138	43	80	69	123	23	489
			3%	28%	9%	16%	14%	25%	5%	100%
Total	*12,479*	*Work*	2204	92	1046	470	499	249	124	4684
			47%	2%	22%	10%	11%	5%	3%	100%
		College	62	632	248	356	225	877	57	2457
			3%	26%	10%	14%	9%	36%	2%	100%

Table 3 | *Existing Modal Split Census 2016*

The surveyed 'modal split for the journey to work, school or college' by the residents at the four consulted areas as surveyed in Census 2016 recorded that 57% of 12,479 population generated 7,141 trips for the journey to work, school or college. Work trips made up for 66% of trips generated in the area, some 49% were by car, 22% by Train, 10% by Bus, 11% by Bicycle, 5% On foot and 3% were others or not stated. College trips made up 34% of the trips generated in the area, some 29% were by car (26% of these were car passenger), 10% by Train, 14% by Bus, 9% by Bicycle, 36% by Foot, and 2% were others or not stated.

5. Bus Capacity

In order to assess the existing capacity of the existing buses available to the proposed development, the maximum capacity of each bus was found by assessing the current fleet of buses currently used by Dublin Bus.

The passenger capacities of the double deck buses in the current Dublin Bus fleet below reproduced from the Dublin Bus website are shown in Table 3. The passenger capacity of each bus including standing is some 87 passengers on the basis of the average capacity of the fleet of buses available at Dublin Bus.

However, for the purpose of this report, standing passengers have been excluded and the capacity of the double decker buses in operation with Dublin Bus and GoAhead on the various routes surveyed has been conservatively taken as an average of 67 seats.

Quantity	Manufacturer	Type	Fleet Code	Passenger Capacity
76	Volvo	B7TL with ALX400 bodywork	AV	91
70	Volvo	B9TLT (Euro 4) with Enviro500 bodywork	VT	119–124
192	Volvo	B7TL (Mk. II) with ALX400 bodywork	AX	91
97	Volvo	B9TL (Euro 4) with Enviro400 bodywork	EV	94
50	Volvo	B9TL (Euro 4) with Gemini bodywork	VG	88
160	Volvo	B9TL (Euro 5) with Gemini bodywork	GT	78–81
369	Volvo	B5TL (Euro 6) with Gemini 3 bodywork	SG	95

Table 4 | *Bus Capacity*

6. Dart Capacity

The train capacities used in Table 2 have been based on Appendix C from the NTA *Heavy Rail Census* 2019. Appendix C from the Census is reproduced as Table 4 below.

Appendix C: Train Capacity by Type

Train Type		Capacity	
4-DART	(4 car DART set)	700	- Seats + Standing Accommodation
6-DART	(6 car DART set)	1050	- Seats + Standing Accommodation
8-DART	(8 car dart set)	1400	- Seats + Standing Accommodation
2 x 2600	(2 car commuter rail car)	206 -	Seats + Standing Accommodation
2 x 2800	(2 car commuter rail car)	221	- Seats + Standing Accommodation
4 x 29000	(4 car Commuter railcar)	640	- Seats + Standing Accommodation
8 x 29000	(8 car Commuter railcar)	1280	- Seats + Standing Accommodation
1 x 3ICR	(3-car InterCity railcar)	190	- Seats
1 x 6ICR	(6-car Premier Class InterCity railcar)	376	- Seats
1 x 6HCR	(6-car High Capacity InterCity Railcar)	406	- Seats
7 x MkIV	(7 car Mk IV set)	348	- Seats
7 x DD	(7 car De Dietrich set)	358	- Seats

Table 5 | *Dart Capacity*

7. Bus Survey on Howth Road

The nearest bus stop to the subject site is the Bus Stop no. 606 on Howth Road travelling towards the city centre. The bus capacity survey was undertaken by Waterman Moylan on citybound services during the AM Peak between 07:00 and 09:00 on Monday 25th July 2022.

Time	Route	Passengers	Spare Capacity
7.02	H2	0	67
7.08	H1	7	60
7.19	H3	3	64
7.27	H1	13	54
7.29	H2	20	47
7.37	6	10	57
7.40	H1	27	40
7.50	H1	27	40
7.52	H3	34	34
8.08	H2	17	50
8.09	H1	34	34
8.11	6	13	54
8.19	H3	20	47
8.27	H1	20	47
8.37	H2	13	54
8.09	H1	10	57
8.50	6	0	67
8.52	H3	13	54
8.54	H1	10	57

***Table 6** | Bus Survey Results*

For the 15-minute interval survey in Table 6, it will be seen that the busiest period in terms of passenger's loadings occurs between 08:00 and 09:00.

The passenger numbers were relatively consistent after the hours 07:00 – 08:00 during the survey with hourly loadings of 141 – 278 per hour varying as follows:

- 7.00 – 8.00: 141 passengers per hour
- 7.15 – 8.15: 198 passengers per hour

- 7.30 – 8.30: 255 passengers per hour
- 7.45 – 8.45: 278 passengers per hour
- 8.00 – 9.00: 204 passengers per hour.

The loadings and spare capacity during the AM Peak Hour 07:00 – 08:00 are presented in Table 6. From Table 7, it will be seen that some 30% of the 670 seats on the 10 buses were occupied and 70% were spare.

Overall, between 07:00 and 09:00, the seats filled amounts to 32% of the total capacity and the empty seats amounted to 68% of the total capacity.

Period	No. of Buses	Passengers	Spare Capacity Seats
7.00 – 7.15	2	7	127
7.15 – 7.30	3	37	97
7.30 – 7.45	2	37	97
7.45 – 8.00	2	60	74
8.00 - 8.15	3	64	137
8.15 – 8.30	2	94	40
8.30 – 8.45	2	23	111
8.45 – 9.00	3	23	178
Total	19	345	861

Table 7 | *Bus Survey - 15 minute intervals*

Period	No. of Buses	Passengers	Spare Capacity Seats
8.00 - 8.15	3	64	137
8.15 – 8.30	2	94	40
8.30 – 8.45	2	23	111
8.45 – 9.00	3	23	178
Total	10	204	466

Table 8 | *Peak Hour Capacity*

A total of 466 seats are in spare capacity. This survey was completed outside the school year and therefore in order to get a more robust assessment 40% of the spare capacity has been removed. This 40% is based on the existing model split for the area extracted from the Small Areas Maps Census 2016. The spare capacity for bus services is 280 seats.

8. Dart Survey

8.1 Rail Travel – Census 2019

The National Heavy Rail Census was carried out by Iarnord Eireann in 2019 on behalf of the Natila Transport Authority (NTA). The final report published in July 2020 recorded ongoing annual increases in passenger numbers at all Dart Stations Station. These increases are likely to continue for a number of years into the future.

As part of this assessment, only the AM peak hour travelling towards the City Centre (Southbound) will be assessed. The majority of people will be travelling to the city centre for school or employment and the busiest Dart Stations are Connolly, Tara Street and Pearse Station which are further southbound to Harmonstown and Killester. The Dart Stations assessed are as follows:

- Malahide Station
- Portmarnock Station
- Clongriffin Station
- Howth Station
- Sutton Station
- Bayside Station
- Howth Junction/ Donaghmede Station
- Killbarack Station
- Rahney Station
- Harmonstown Station
- Killester Station

There are two separate routes for the Dart which begin at Malahide Station or Howth Station. Both routes connect at Howth Junction/Donaghmede Station as shown in the figure below. For the purposes of this assessment, each station will be assessed individually and based on the number of Darts that arrive within the AM peak hour.

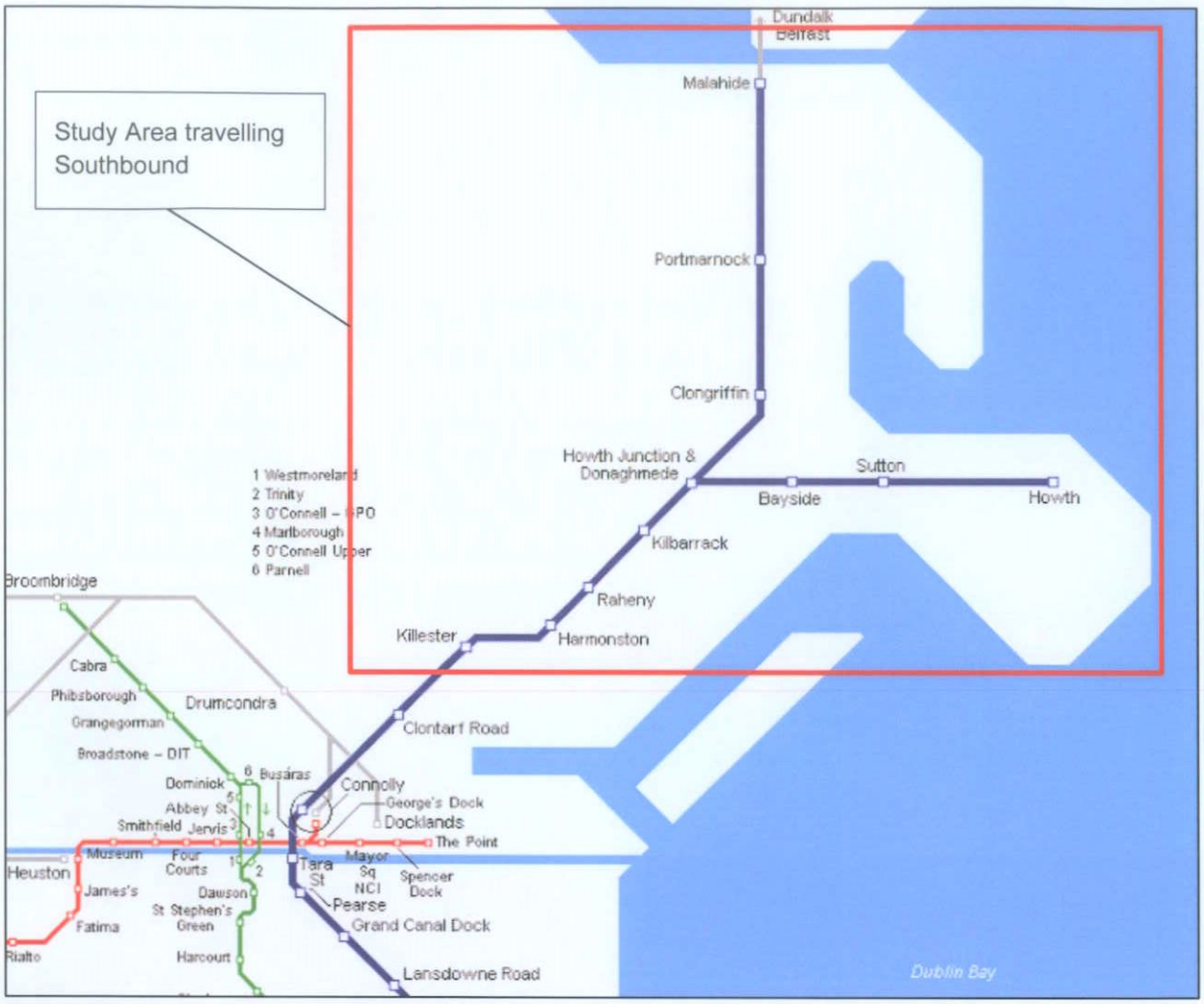


***Figure 5** | Dart Stations Assessed*

The results of the census for passengers' numbers per day at Harmonstown and Killester are presented in the tables below.

Station	Activity	2019	2018	2017	2016	2015	2014	2013
Malahide	Boardings	3456	3952	3324	2626	2604	2086	2177
	Alightings	3597	3629	3030	2158	2508	1992	2178
Portmarnock	Boardings	2121	1401	1981	1450	1191	1182	1186
	Alightings	1318	1289	1729	974	899	940	978
Clongriffin	Boardings	1640	1576	1296	1256	1013	830	767
	Alightings	1706	1431	1219	985	875	726	567
Howth	Boardings	1379	1805	1439	1240	1259	875	1073
	Alightings	1329	1625	1560	1138	1286	898	1225

Sutton	Boardings	931	1004	974	963	741	669	689
	Alightings	914	912	919	662	536	640	616
Bayside	Boardings	1329	1799	1502	1400	1403	1222	1156
	Alightings	1341	1211	1281	1250	1113	1091	1048
Howth Junciton	Boardings	1727	1886	2163	1818	1715	1613	1667
	Alightings	2015	2151	2169	2044	2179	1708	1836
Killbarack	Boardings	1663	1694	1516	1373	1368	1106	1043
	Alightings	1473	1663	1552	1331	955	1112	1072
Rahney	Boardings	2207	2417	2150	2024	1883	1758	1641
	Alightings	2131	2254	2089	2161	1789	1698	1493
Harmonstown	Boardings	1406	1609	1314	1396	1071	998	1011
	Alightings	1310	144	1284	1312	990	897	823
Killester	Boardings	2665	2347	2197	2225	1786	1595	1575
	Alightings	2052	2061	2024	2170	1547	1511	1386

Table 9 | *Daily Boarding and Alighting Numbers (2013 – 2019)*

Station	Activity	Southbound (2019)
Malahide	Boardings	2229
	Alightings	0
Portmarnock	Boardings	1538
	Alightings	47
Clongriffin	Boardings	1301
	Alightings	101
Howth	Boardings	1377
	Alightings	23
Sutton	Boardings	843
	Alightings	72
Bayside	Boardings	1160
	Alightings	133
Howth Junciton	Boardings	1124
	Alightings	425
Killbarack	Boardings	1340

	Alightings	339
Rahney	Boardings	1976
	Alightings	232
Harmonstown	Boardings	1262
	Alightings	145
Killester	Boardings	2391
	Alightings	252

***Table 10** | 2019 Southbound - Passenger Numbers*

8.2 Daily Rail Passenger Numbers 2022

In order to calculate the Daily passengers for 2022, the census data from 2013 – 2019 was used to calculate a growth rate which can be applied to the 2019 passenger numbers. These growth rates were found using Table 7 above.

Station	Activity	Southbound (2022)
Malahide	Boardings	2790
	Alightings	0
Portmarnock	Boardings	2058
	Alightings	54
Clongriffin	Boardings	1936
	Alightings	188
Howth	Boardings	1545
	Alightings	24
Sutton	Boardings	970
	Alightings	87
Bayside	Boardings	1234
	Alightings	149
Howth Junciton	Boardings	1141
	Alightings	443
Killbarack	Boardings	1681
	Alightings	393
Rahney	Boardings	2268
	Alightings	274
Harmonstown	Boardings	1473
	Alightings	182

Killester	Boardings	3100
	Alightings	304

***Table 11** | 2022 - Southbound - Passenger Numbers*

8.3 Peak hour Rail Boardings 2022

The hourly profile surveyed during the Rail Census recorded that 17% of the overall daily passenger demand occurred during the AM peak hour.

The proportion of passenger numbers during the AM Peak Hour varies significantly with the location of the rail station whether the city centre or the Greater Dublin Area.

It was assumed that 25% of the daily boarding and alighting occur during the AM Peak hour. Based on these assumptions, the peak hour passenger numbers for the Stations in 2022 are presented in the table below.

Station	Activity	Southbound (AM Peak Hour)
Malahide	Boardings	698
	Alightings	0
Portmarnock	Boardings	514
	Alightings	14
Clongriffin	Boardings	484
	Alightings	47
Howth	Boardings	386
	Alightings	6
Sutton	Boardings	242
	Alightings	22
Bayside	Boardings	309
	Alightings	37
Howth Junciton	Boardings	285
	Alightings	111
Killbarack	Boardings	420
	Alightings	98
Rahney	Boardings	567
	Alightings	69
Harmonstown	Boardings	368

	Alightings	45
Killester	Boardings	775
	Alightings	76

***Table 12** | AM Peak Hour - Passenger Numbers*

8.4 Additional Rail Passengers – Capacity

Details of train capacity by type are set out in Appendix C of the National Rail Census 2019. Due to the large volume of passengers during the peak hour, the '8 car Dart set' is assumed to be used. This '8 car Dart set' has the capacity for 1,400 passengers both sitting and standing.

Based on the information given on the Irish Rail Website, during the hours of 6.50am to 8pm there is a Dart train every 10-minutes on the Howth to Bray section of the line and every 30 minutes on the Malahide to Greystones section of the line.

A breakdown of how many Dart trains will service each station is shown below.

Station	No. Of Darts within AM Peak Hour	Average No. of Passenger per Dart (Boarding – Alightings)
Malahide	2	349
Portmarnock	2	250
Clongriffin	2	55
Howth	6	63
Sutton	6	37
Bayside	6	45
Howth Junction	8	22
Killbarack	8	40
Raheny	8	62
Harmonstown	8	40
Killester	8	87

***Table 13** | No. of Darts per Station (AM peak Hour)*

Based on table 11 above the average number of passengers per Dart train can be calculated for the AM peak hour travelling southbound. This was done for two separated scenarios:

- Scenario 1: Howth Station to Killester Station
- Scenario 2: Malahide Station to Killester Station

The assessment will be based on the capacity of the '8 car Dart set' of 1400 and if the boardings per station greater than 1400 then the Dart is considered over capacity. The tables below show the results.

Scenario 1 – Howth to Killester			
Station	Boardings	Alightings	No. of Passengers per Dart
Howth	64	1	63
Sutton	40	4	100
Bayside	51	6	145
Howth Junction	36	14	167
Killbarack	53	12	207
Raheny	71	9	270
Harmonstown	46	6	310
Killester	97	9	398

Table 14 | *Scenario 1 - Dart Capacity Assessment*

Scenario 2 – Malahide to Killester			
Station	Boardings	Alightings	No. of Passengers per Dart
Malahide	349	0	349
Portmarnock	257	7	599
Clongriffin	60	6	654
Howth Junction	36	14	676
Killbarack	53	12	716
Raheny	71	9	778
Harmonstown	46	6	819
Killester	97	9	906

Table 15 | *Scenario 2 - Dart Capacity Assessment*

Based on the results shown in the tables above Harmonstown Station will have a spare capacity of 581 to 1090 between sitting and standing. Killester station will have a spare capacity of 494 to 1002 spaces. This spare capacity is over the 8 Dart Trains servicing each station during the AM peak hour.

To obtain a more robust assessment the minimum spare capacity will be used as part of the assessment. This is 581 spare capacities available for Harmonstown and 494 spare capacities available for Killester.

9. Assessment of Spare Capacity – Bus Services

9.1 Design Population

Based on the Irish Water Standard of 2.6 persons per unit, the expected population of the proposed development is some 1508 persons (580 x 2.6 persons / unit).

9.2 Modal Split – Bus

Target modal splits for various location around Dublin City Council areas in 2028 are set in the DCC Draft Development Plan 2022 – 2028. At the time of writing this, the DCC Development Plan 2022 - 2028 is set to become active in August 2022.

The Target Modal Split for DCC lands is outlined below.

- Walking: 13%
- Cycling: 13%
- Public Transport (bus, rail, LUAS): 57%*
- Private Vehicles (Car, taxi, goods, motorcycles): 17%

*The increase in public transport mode share anticipates the construction of major public transport infrastructure that is proposed to occur over the lifetime of the plan. The impact of public transport infrastructure projects on mode share is more likely to come into fruition during the lifespan of the following plan.

If these targets are applied to the design population, the number of residents travelling to work or education by bus, rail or LUAS is expected to be 861. Based on the existing model split it is assumed that 75% of these expected trips will use the DART Services and the remaining 25% will use Bus services. Therefore, 215 persons are expected to use the bus service.

9.3 Demand for Bus Services

Up to 215 of the residents at the proposed development can be expected to travel to work or education by bus. Based on the location of the proposed development, it is expected 80% of the trips will travel southbound towards the city centre with 50% travelling in the AM Peak Hour.

Based on these proportions, the expected demand for southbound services from the proposed development is 86 persons.

9.4 Bus Capacity

The average bus capacity has been taken at 67 seats per bus as Section 5.0 of this report.

9.5 Demand vs Capacity

Based on the survey earlier in this report, the spare capacity on inbound bus services to the City Centre during the AM Peak hour of 08:00 – 09:00 is 280 seats per hour (10 buses) as set out in Table 7.

From Table 7, it will be seen that the spare capacity during the AM Peak Hour 08:00 – 09:00 (280 seats) is some 42% of the overall capacity (670 seats). This spare capacity is particularly robust as is excludes standing passengers and Bus Eireann services.

In terms of spare capacity for the proposed development on the subject site, this spare capacity is significantly greater than the future additional demand of 86 passengers during the same period.

10. Assessment of Rail Capacity – Rail Services

10.1 Design Population

Based on the Irish Water Standard of 2.6 persons per unit, the expected population of the proposed development is some 1508 persons (580 x 2.6 persons / unit).

10.2 Modal Split – Rail

Target modal splits for various location around Dublin City Council areas in 2028 are set in the DCC Draft Development Plan 2022 – 2028.

The Target Modal Split for DCC lands is outlined below.

- Walking: 13%
- Cycling: 13%
- Public Transport (bus, rail, LUAS): 57%*
- Private Vehicles (Car, taxi, goods, motorcycles): 17%

*The increase in public transport mode share anticipates the construction of major public transport infrastructure that is proposed to occur over the lifetime of the plan. The impact of public transport infrastructure projects on mode share is more likely to come into fruition during the lifespan of the following plan.

If these targets are applied to the design population, the number of residents travelling to work or education by bus, rail or LUAS is expected to be 861. Based on the existing model split it is assumed that 75% of these expected trips will use the DART Services and the remaining 25% will use Bus services. Therefore, 612 persons are expected to use the bus service.

10.3 Demand for Rail Services

Up to 612 of the residents at the proposed development can be expected to travel to work or education by bus. Based on the location of the proposed development, it is expected 80% of the trips will travel southbound towards the city centre with 50% travelling in the AM Peak Hour.

Based on these proportions, the expected demand for southbound services from the proposed development is 245 persons.

10.4 Train Capacity

The capacity of the various railcars used on the Dart is presented in Table 4 of this report.

10.5 Demand vs Capacity

Based on the Rail Census 2019 surveys described earlier in this report, the spare capacity of inbound services to the City Centre (Southbound) during the AM Peak Hour 08:00 – 09:00 is 11,200 (8 Trains) as set out in Table 12.

In order to get a robust assessment, the demand vs capacity will take the minimum capacity value between both stations. From Table 13 and 14, taking the minimum capacity value, it will be seen that the spare capacity during the AM Peak Hour 08:00 – 09:00 (494 seats) is some 4.4% of the overall capacity (11,200).

In terms of spare capacity for the proposed development, this spare capacity is greater than the future additional demand of 245 passengers during the same period.

11. Conclusion

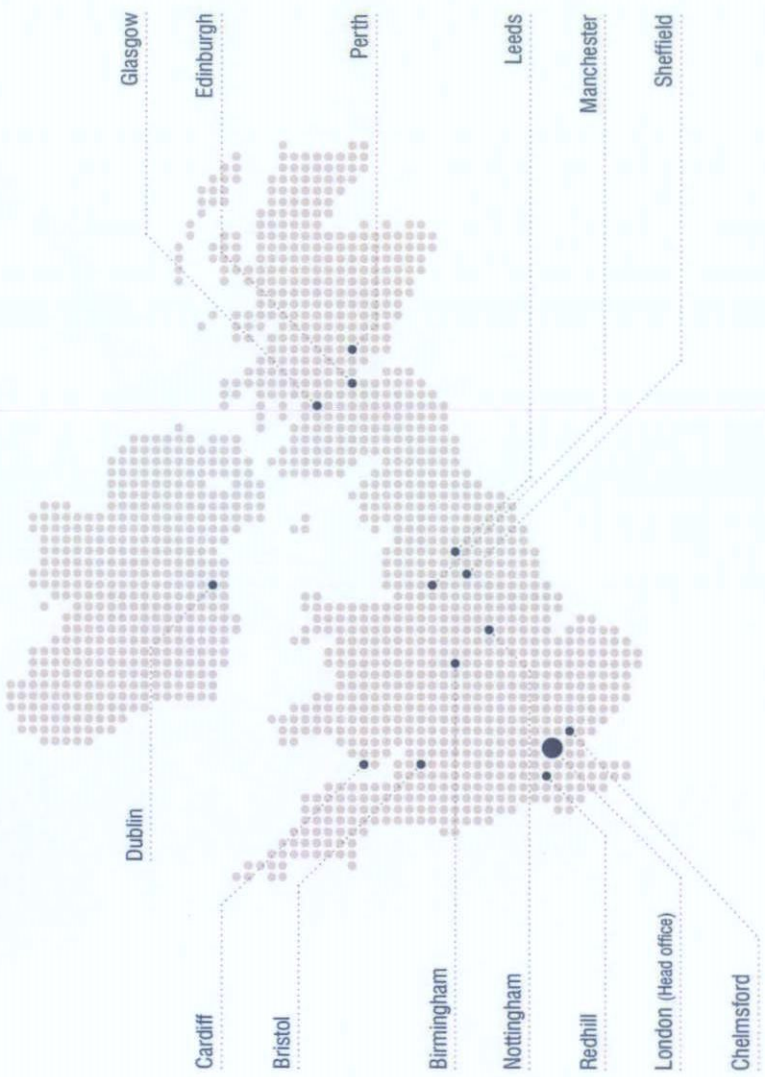
This public transport capacity assessment has been carried out by Waterman Moylan to assess the bus and train services that serve the subject site.

The assessment includes surveys of the current bus and rail usage, estimations of public transport use by residents of the completed development, application of appropriate growth factors, and an assessment to determine whether the existing transport network has capacity to cater for the proposed development.

Based on the assessment, as set out in the sections above, the is sufficient capacity in both the existing bus and rail networks to cater for the anticipated passenger journeys that will be generated by the proposed development.

Furthermore, proposed improvements to the public transport services, including the BusConnects project and the Dart Expansion Programme, as discussed in the Sections above, will enhance the transport options available to residents once implemented.

UK and Ireland Office Locations

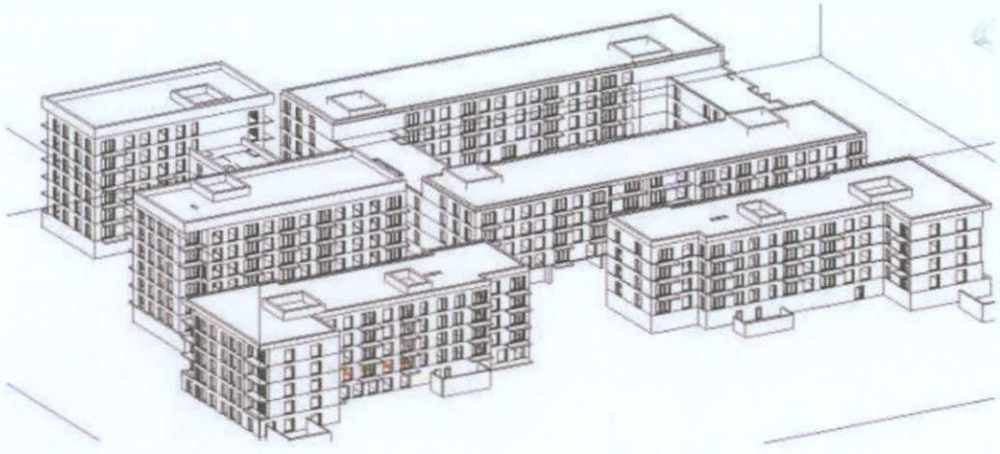


Enviroguide CONSULTING

Appendix P Mechanical and Electrical Utilities Report

Foxlands
Raheny

Lands east of St Paul's College
Sybil Hill Road
Raheny
Dublin 5



Raheny 3 Limited Partnership

M&E Utilities report
IN2 Project No. D2140
30th August 2022
Rev09

Revision History

Date	Revision	Description
24/11/2021	00	Initial issue for client review
13/12/2021	01	Planning Stage
13-05-2022	02	Planning Stage
27-05-2022	03	Planning Stage
08-07-2022	04	Planning Stage
25-07-2022	05	Planning Stage
02-08-2022	06	Planning Stage
16-08-2022	07	Planning Stage
29-08-2022	08	Amended with updated description of development
30-08-2022	09	Amended following design team comments

Table of Contents

1.0 Executive Summary

IN2 Engineering Design Partnership have been retained by Raheny 3 Limited Partnership to complete a Planning Stage Report for the proposed Residential development at Sybil Hill Road, Raheny, Co. Dublin.

The proposed development consists of the construction of a residential and nursing home development set out in 7 no. blocks, ranging in height from 4-7 storeys to accommodate 580 no. apartments, residential tenant amenity spaces, a crèche and a 100 bed nursing home. The site will accommodate car parking spaces, bicycle parking spaces, storage, services and plant areas at both basement and podium level. Landscaping will include extensive communal amenity areas, and a significant public open space provision on the east and south of the site. The proposed application includes all site landscaping works, green roofs, substations, boundary treatments, lighting, servicing, signage, surface water attenuation facilities and associated and ancillary works, including site development works and services above and below ground. For a full description of the proposed development please refer to the Statutory Notices.

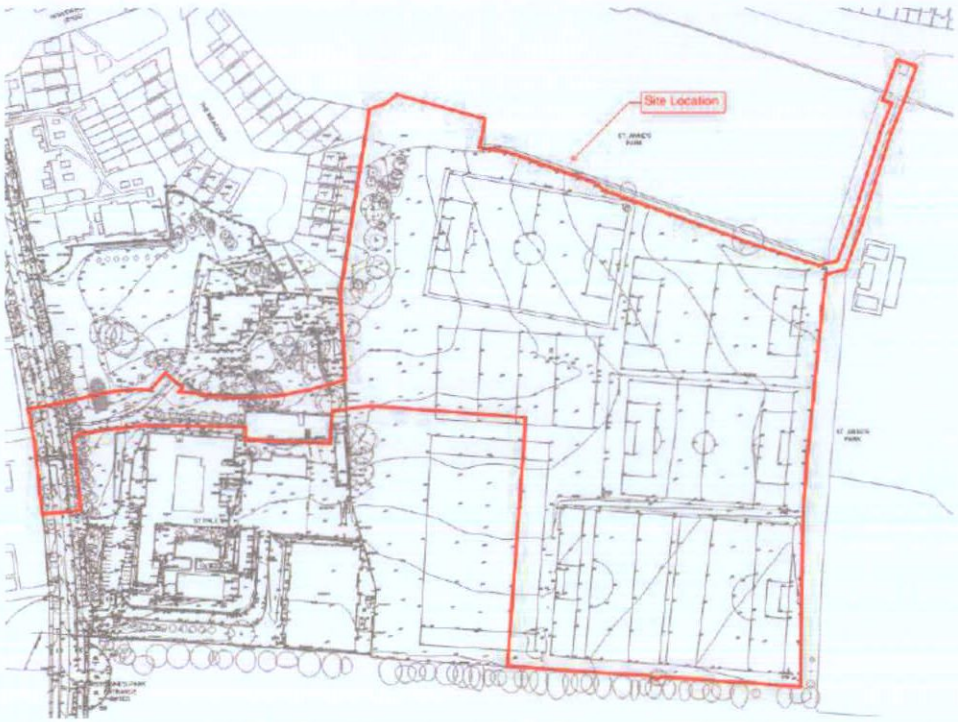


Fig 1.1 Site location & boundary (Indicative Only)

The existing infrastructure connections have been identified. The utility connections shall be decommissioned, isolated, and removed prior to the commencement of site construction.

New infrastructure connections have been considered in the design of the proposed residential development and there are no issues identified in preliminary analysis with infrastructure to supply the new development.

A comms frame room has been included in the basements for incoming telecoms connections to incoming telecoms service provider city network infrastructures this includes EIR and Virgin Media services.

The heating strategy for the apartments is a full electrical solution utilising electrically driven Exhaust Air Heat Pump and Air Source heat Pump plant. Therefore, no new natural gas connection is required for this development.

2.0 ESB Infrastructure

The site is well located with regards to ESB infrastructure. The ESB Networks drawing below indicates the network distribution capacity to Foxlands development.

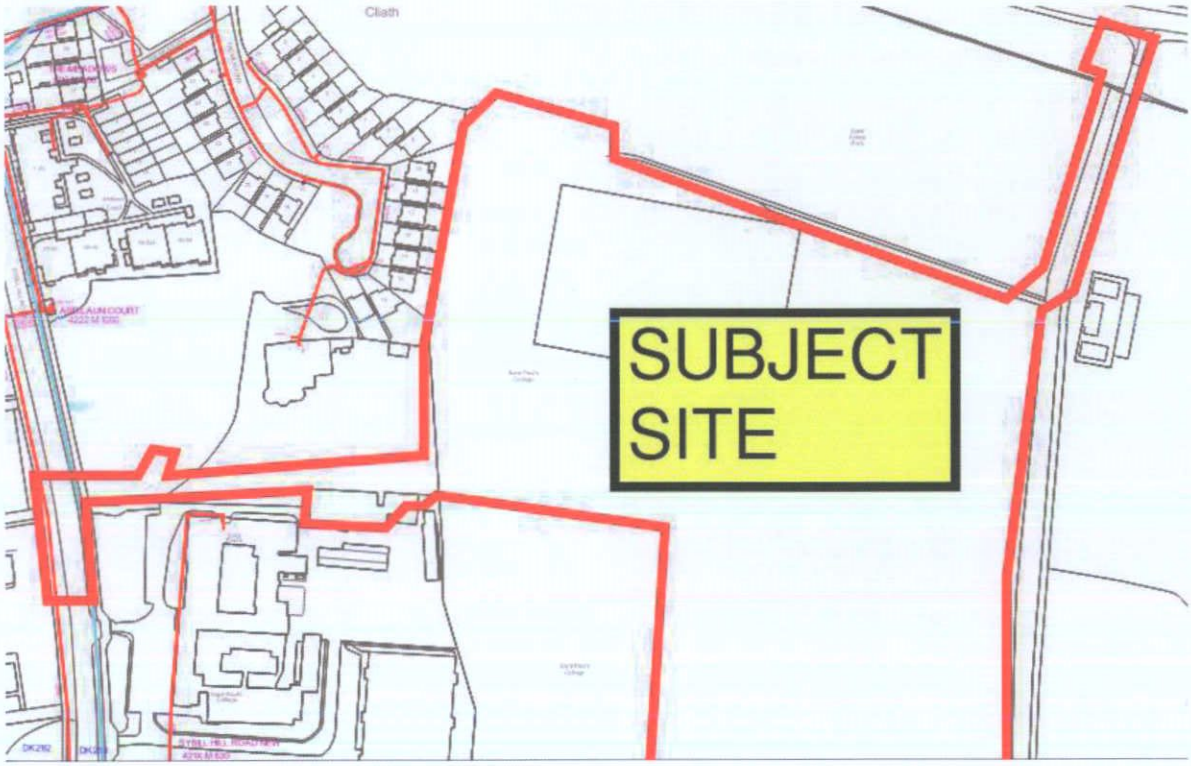


Fig 2.1 ESB Networks Map of Site Surrounds (Indicative Only)

Initial contact has been made with the ESB and there are currently no issues with the provision of the required power to the proposed development. There doesn't appear to be any cables traversing the site. There are 38kV and 20kV/10kV LV/MV underground cables on Sybil Hill road.

The power supply to support the new development has been discussed with utility provider, ESB Networks. The utility provider has raised no concerns providing power to the development. Only on planning application approval, can full formal application be made to ESB Networks. The proposed locations can be viewed in Figure 2.2 below.

Fig 2.2 Proposed location of new ESB sub-stations (Indicative Only)

3.0 Gas Infrastructure

The Gas Networks map for the surrounding area indicates buried natural gas pipework local to development to Sybil Road and neighbouring site. There appears to be no existing natural gas connection to the proposed site.

The utility strategy for the Foxlands residential development is to avail of a decentralised heating plant consisting of electrically driven exhaust air heat pumps located within the apartments and air source heat pumps for amenity spaces.

No natural gas supply is required for the development.

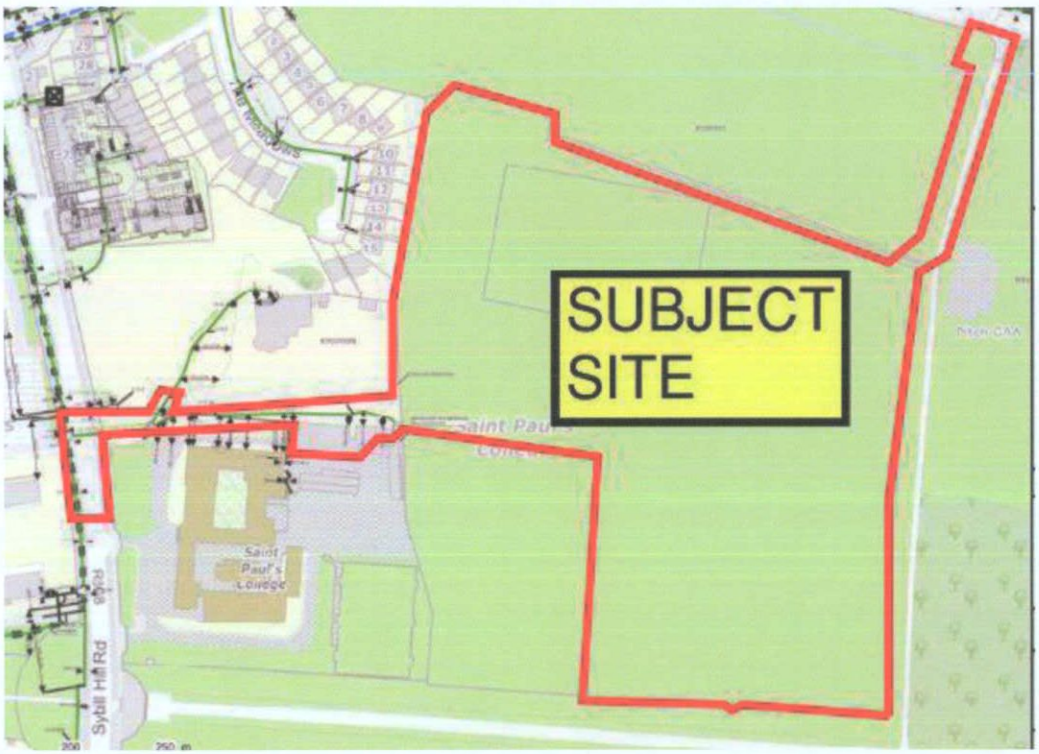


Fig 3.1 Gas Networks Map of Site Surrounds (Indicative Only)

4.0 Telecoms - EIR

EIR infrastructure indicates buried telecom network local to development to Sybil Road and Howth Road and neighbouring sites. There appears to be no existing telecom network connection to the proposed site.

The telecom network supply to support the new development has been discussed with utility provider, Eir. The utility provider has raised no concerns providing telecom services to the development at this stage. Only on full planning application approval, can full formal application be made to Eir.

It is proposed to provide a new Landlord comms room in the basements where all incoming telecoms providers shall terminate their incoming cables. A new fibre cable connection shall be provided to the development.

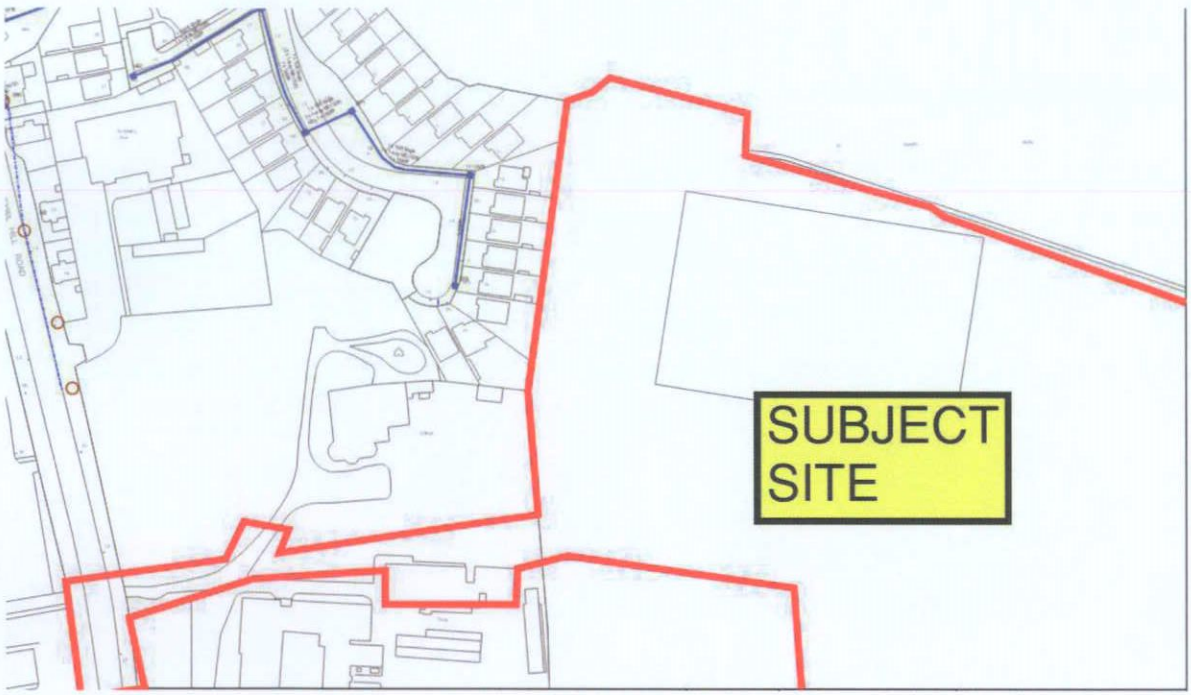


Fig 4.1 EIR Networks Map of Site Surrounds (Indicative Only)

5.0 Telecoms - Virgin Media

Virgin Media infrastructure indicates buried telecom network local to development to Sybil Road and Howth Road and neighbouring sites. There appears to be no existing telecom network connection to the proposed site.

The telecom network supply to support the new development has been discussed with utility provider, Virgin Media. The utility provider has raised no concerns providing telecom services to the development at this stage. Only on full planning application approval, can full formal application be made to Virgin Media.

It is proposed to provide new Landlord comms room in the basements where all incoming telecoms providers shall terminate their incoming cables. A new fibre cable connection shall be provided to development.

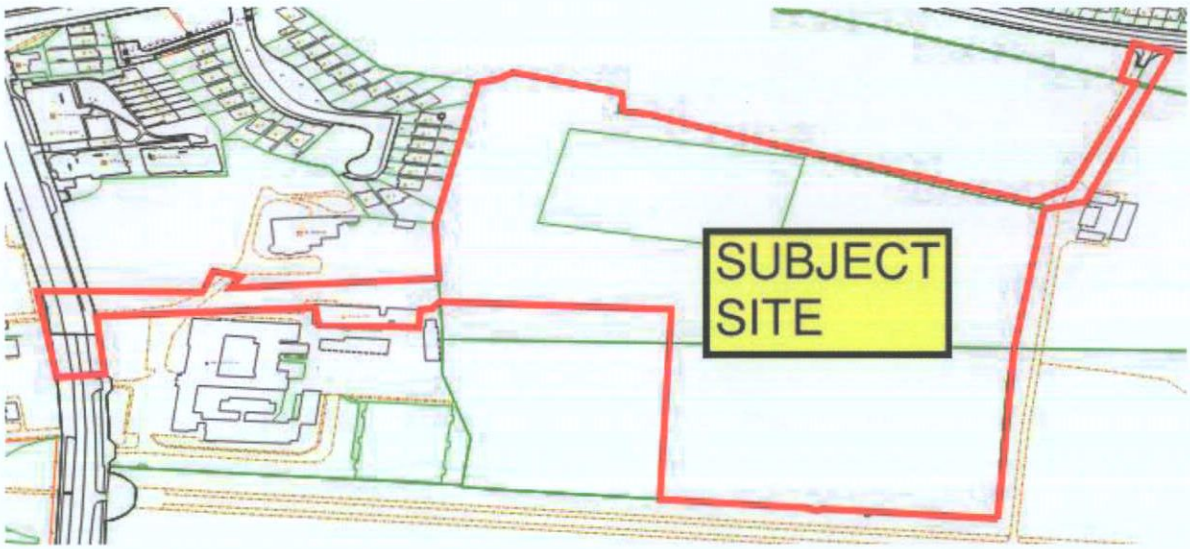


Fig 5.1 Virgin Media Networks Map of Site Surrounds (Indicative Only)

6.0 Electric Vehicles Infrastructure

The development will include Electric Vehicle (EV) charging points to 59 no. spaces of the parking spaces. There will be EV charging infrastructure, comprising cable ducting systems, cable ladders, cable trays, cable trunking systems, conduit, etc., provided to every parking space in compliance with Part L 2021 building regulation requirements.

The Car Parking Strategy provides for a total of **520 Car Parking spaces (59 EV spaces)**, as follows:

Description		Proposed Car Parking				
		Standard	*Accessible*	*EV*	*Dropoff*	**Total**
Apartment Blocks	Block A	41	2	7	1	51
	Block B	45	3	7	1	56
	Block C	75	5	9	-	89
	Block D	93	5	12	3	113
	Block E	64	4	8	-	76
	Block F	23	2	3	1	29
Mixed-Use (Block G)	Apartments	47	2	6	2	57
	Nursing Home	23	9	7	2	41
	Crèche	5	1	-	2	8
Total		**416**	**33**	**59**	**12**	**520**

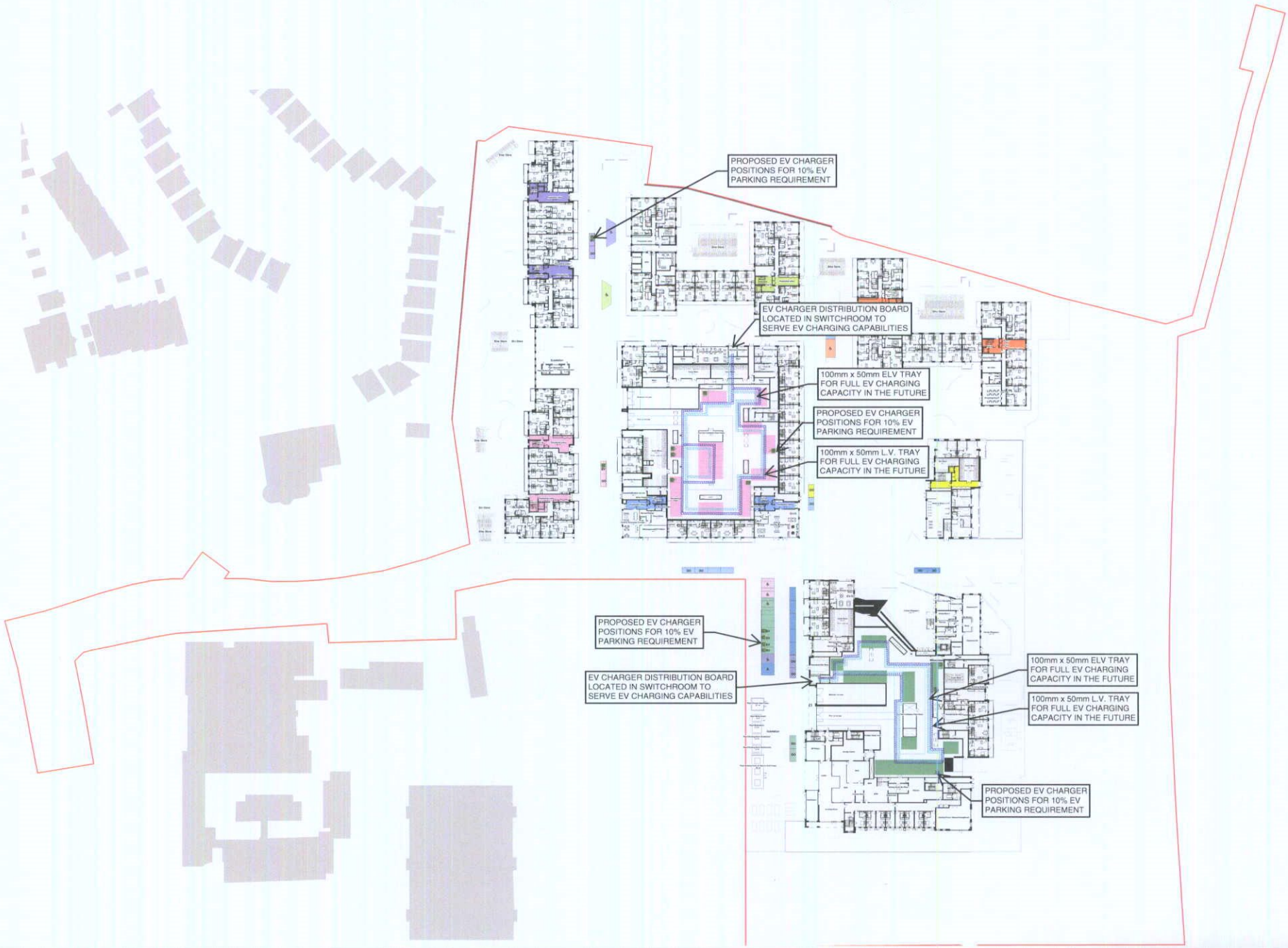
The infrastructure will be routed back to a dedicated EV charger boards with their own ESB Electricity Meter connection. The EV infrastructure will be adequately designed to meet the full capacity of all recharging points when installed and appropriately sized for EV charging point capacity. The ESB sub-stations have been sized to accommodate the electrical loads associated with the future provision of EV charging to all parking spaces.

The ducting infrastructure will be fit for purpose, capped as appropriate and clearly identified. Adequate space will be provided to accommodate all EV Charing point ducting connections and electrical supply equipment and will be adequately designed for maintenance access.

The complete EV infrastructure installations, including associated electrical equipment, etc. will be installed in accordance with the general wiring rules and safety requirements as outlined in the National Rules for Electrical Installations I.S. 10101:2020.

See the following drawings for a preliminary layout for the basement and podium EV infrastructure as listed below;

- D2140-IN2-01-00-DR-E-7001 EV LAYOUT
- D2140-IN2-01-B1-DR-E-7001 EV LAYOUT



DRAWING REFERENCE KEY

- EV CHARGER
- LV CABLE TRAY (SIZE AS INDICATED)
- ELV CABLE TRAY (SIZE AS INDICATED)

PLAN NO: LRD6002/22-S3 REC:06/09/2022

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P1-1	02-08-2022	PLANNING STAGE ISSUE	DS	LHC	JR

PROJECT
FOXLANDS RESIDENTIAL

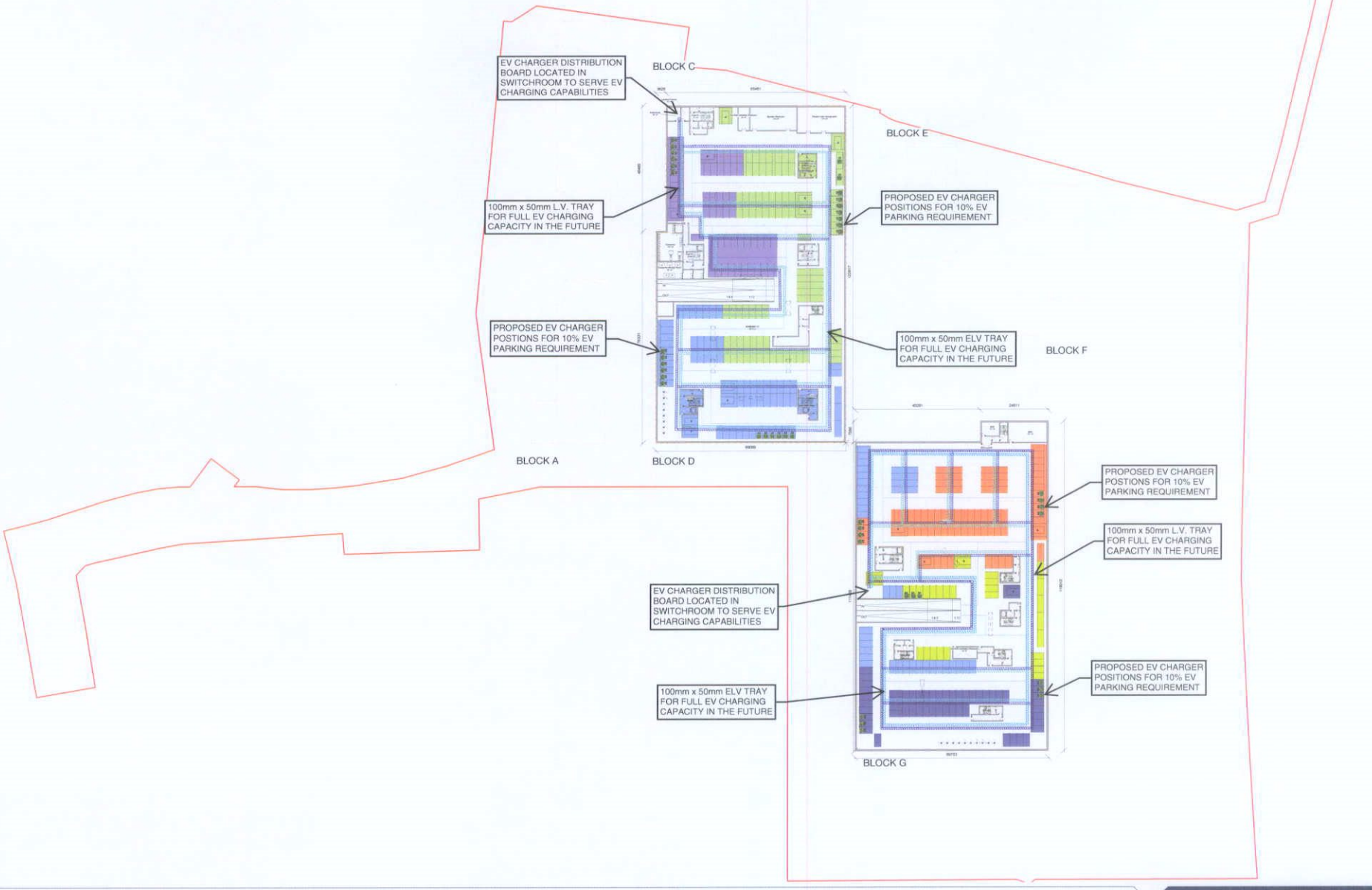
CLIENT

DRAWING TITLE
ELECTRICAL SERVICES INSTALLATION
PODIUM PLAN
ELECTRIC VEHICLE (EV) INFRASTRUCTURE LAYOUT

IN2

STATUS
P1-2

IN2 REF | DRAWING No. | SCALE | SIZE



DRAWING REFERENCE KEY

EV CHARGER

LV CABLE TRAY (SIZE AS INDICATED)

ELV CABLE TRAY (SIZE AS INDICATED)

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31-08-2022	PLANNING STAGE ISSUE	DS	LHC	JR
02-08-2022	PLANNING STAGE ISSUE	DS	LHC	JR

PROJECT
FOXLANDS RESIDENTIAL

CLIENT

DRAWING TITLE
ELECTRICAL SERVICES INSTALLATION
PODIUM PLAN
ELECTRIC VEHICLE (EV) INFRASTRUCTURE LAYOUT

IN2

STATUS
P1-2

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