

Luas Finglas

Environmental Impact Assessment Report 2024

Appendix A16.2: Electromagnetic Compatibility Desktop Survey

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SECTION 1: Introduction and Objectives

1.1 Context

Luas Finglas is the proposed new northern extension of the Luas Green Line from its current terminus in Broombridge to a new terminus in Charlestown, near the N2-M50 interchange, it is approximately 4km long, with 4 new stops, two new substations, two main bridges, and a new extension to Broombridge depot. The general environment of the new line runs through a combination of industrial areas, residential areas, street running, green field areas and an interface with an existing railway line.

This EMC Desktop Survey follows on from the initial high-level desktop survey carried out within Technical Note Reference Design Report - EMC and Stray Current (October 2023).

The desktop survey of the route has been carried out using the Preliminary Design Drawings and Google Earth pro to identify the lineside neighbours and any EMC areas of concern. The drawings referred to are:

- AREA31 Landscape General Arrangement 1 of 3 (D1-AL 31 O-A)
- AREA31 Landscape General Arrangement 2 of 3 (D1-AL 31 A-B)
- AREA31 Landscape General Arrangement 3 of 3 (D1-AL 31 B-O/1)
- AREA32 Landscape General Arrangement 1 of 5 (D1-AL 32 O-A)
- AREA32 Landscape General Arrangement 2 of 5 (D1-AL 32 A-B)
- AREA32 Landscape General Arrangement 3 of 5 (D1-AL 32 B-C/1)
- AREA33 Landscape General Arrangement 1 of 6 (D1-AL 33 O-A)
- AREA33 Landscape General Arrangement 2 of 6 (D1-AL 33 A-B)
- AREA33 Landscape General Arrangement 4 of 6 (D1-AL 33 C-D)
- AREA33 Landscape General Arrangement 5 of 6 (D1-AL 33 D-O)

Note: These drawings have since been superseded by the Landscape Drawings provided in the RO Drawing Pack.

1.2 Scope

The scope is limited to the proposed route of the new Luas Finglas extension and immediate surrounding area.

The emissions from a railway or tramway have the potential to affect close neighbours. The emissions associated with an electric railway are characterised within the railway EMC emissions standard EN50121-2:2017 (between 150kHz and 1GHz). The limits for a tramway are the lowest limits in the standard (limit line C) and are therefore considered a lower threat compared to mainline electric railways. The expected emissions limit at 10m from the centreline of the closest track is defined in Figure 1 (limit line C) of that standard. It is generally accepted that any neighbours closer than 10m from the track are in a harsher EMI environment than those outside of the 10m boundary. Further to this, it is also generally accepted that any neighbours beyond 20m from the tramway fall into a typical residential and light industrial environment. What this generally means is that any neighbours greater than 20m from the tramway are unlikely to be affected by EMI from the tramway. Nevertheless, to follow due diligence, a boundary of 50m is considered in this survey for identifying neighbours. That said EN50121-2 only addresses frequencies above 150kHz and there have been occasions on other projects of particularly sensitive measurement laboratories being affected by the DC magnetic fields from DC railways and tramways at distances greater than 50m. For this reason, this survey has used a nominal 50m distance to identify the primary neighbours, but a search beyond this distance (up to 1000m) was considered to identify any potentially highly sensitive neighbours – although none were identified.

The above paragraph assumes the tramway as the source of EMI and the neighbours as potential victims, however it is also necessary to consider any potentially noisy neighbours that could adversely affect the new tramway – for example HV power lines, high power transmitters, airports, military establishments etc. For this purpose, a distance of 1000m is considered.

1.3 Background to the EMC Survey

Electrical or magnetic interference can stop electrical or electronic equipment from working correctly. EMC is the ability of equipment or a system to function satisfactorily in its electromagnetic environment, without introducing intolerable electromagnetic disturbances to anything in that environment. The goal of EMC is the correct operation, in the same electromagnetic environment, of different equipment which use electromagnetic phenomena, and the avoidance of any interference effects.

In order to achieve EMC, two aspects need to be considered;

- Emission issues are related to the generation of electromagnetic energy (either intended or unintended) by a source, and to the countermeasures which should be taken in order to reduce such generation or avoid the escape of any remaining energies into the external environment, and;
- Susceptibility or immunity issues, in contrast, refer to the correct operation of electrical equipment; referred to as the victim, in the presence of electromagnetic disturbances.

Simply put, EMC is achieved by addressing both emission and immunity issues; by suppressing the sources of interference and hardening the potential victims where necessary.

The importance of the EMC survey is identifying those neighbours that could be either a victim of EMI from the new tramway, or could be a source of emissions that adversely affects the tramway.

SECTION 2: Abbreviations

EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EMF	Electromagnetic Fields
HV	High Voltage
OHL	Overhead Line

SECTION 3: Methodology

3.1 Scope of the Assessment

The EMC route survey itself has been conducted to identify and record potential sources or victims of EMI within the neighbouring environment. This report covers lineside desktop survey for Luas Finglas extension as presented in Figure 1.

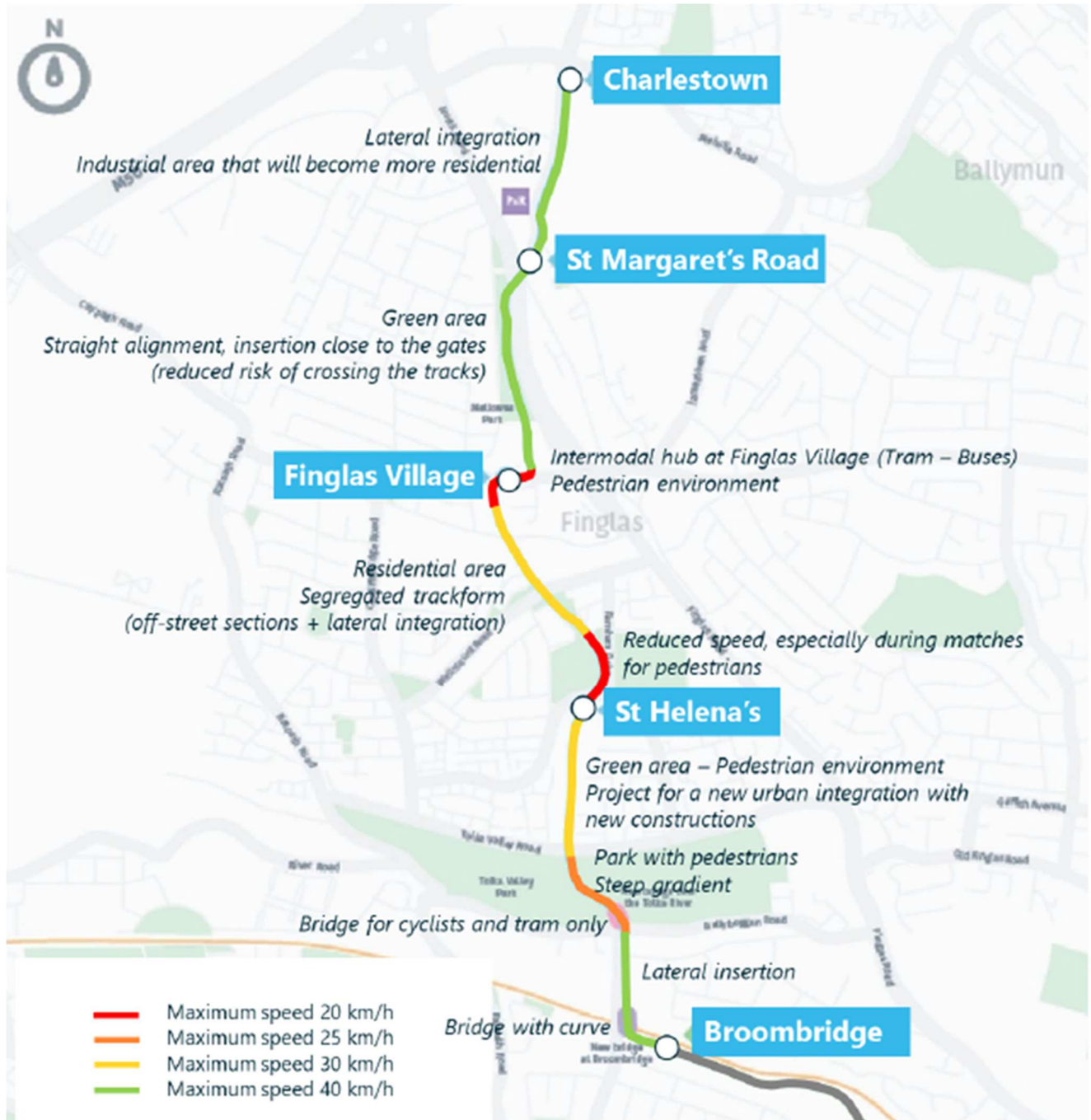


Figure 1 – Overview of the Luas Finglas route extension from Broombridge to Charlestown

As a guide Table 1 provides the survey distances for the identification of key neighbours.

Categories	Distance from track (m)
Hospitals, Clinics and Other Medical Establishments	<100
Educational Premises	<50
Airports	<1000
Recording and Film Studios	<100
Military Establishments	<1000
Research Laboratories	<1000
Intentional and Unintentional Radio Transmitters;	<50
Other Commercial premises (retail unit, light industrial, heavy industrial, etc)	<50
Radio Telescopes	<200
HV Tower Lines	<500
Railway Interfaces	<50 (Stray Current)
Depots and Signal Control Centres	<50

Table 1 - Critical Constructions and Relative Critical Distance

3.2 Safety Scoring System

The scoring system for the third-parties (Residential and commercial) is presented in Table 2 - Risk Scoring Matrix for EMI. This provides a guidance as to those neighbours that present a potentially higher risk and can be the subject of more detailed assessment in later stages of the project. For example, it may identify the need for measurement surveys to establish the EMI environment that the new tramway must operate within or potential mitigation measures that might need to be applied to the tramway to protect it from induced voltages from neighbouring gridlines.

Property Type		Distance from track centreline		
		<20m	20m-50m	>50m
		3	2	1
Residential	1	4	3	2
Industrial	2	5	4	3
Highly sensitive (including hospitals and radio transmitters)	3	6	5	4

Table 2 - Risk Scoring Matrix for EMI

SECTION 4: Scheme Description

After leaving Broombridge Stop the Luas corridor turns north and it will overpass both the Royal Canal and the Maynooth railway line.

The corridor then runs adjacent to the east of Broombridge Road and the Dublin Industrial estate to Ballyboggann Road. At this point it is running parallel to HV overhead lines.

After crossing Ballyboggann Road Luas Finglas will enter Tolka Valley Park adjacent to the protected structure of the Finglas Wood Bridge (RPS 906).

From here, it crosses the central part of the park on a new bridge approaching Tolka Valley Road in proximity of the Carrigallen Estate. Luas Finglas will cross the HV overhead line in the park.

After crossing Tolka Valley Road, the line joins the long strip of green land, Barnamore Grove linear park. Running approximately in the middle of Barnamore Grove Linear Park on grass tracks the Luas reaches St. Helena's Road, where it crosses to the west of the Finglas Youth service. St. Helena's Stop will be provided within the Barnamore Grove Linear Park at a central location along the green area.

Having crossed St. Helena's Road the line proceeds northward, amongst sports grounds between Dunsink Road and Farnham Road, next to Casement Road (off road). The line crosses Wellmount Road approximately at the location of the existing roundabout with Patrickswell Place. North of Wellmount Road the line runs off road, parallel to the west of Patrickswell Place.

The line crosses Cappagh Road and the track alignment passes through the Mellows Crescent estate and then cross Mellows Road. Just before crossing Mellows Road it runs next to the Garda Station that has a tall antenna tower with multiple antennas.

The Luas Finglas Village Stop is proposed to be located adjacent to Mellows Road, in between the Finglas Youth Resource and Sport Centre and the Fire Station, within the Dublin City Park maintenance area.

The alignment would enter Mellows Park, turning north by the Fire Station, which has at least two antennas mounted on the roof, and running along its eastern boundary (along the R135 cutting). One of the new substations will be built next to the Fire Station.

The corridor runs then along the eastern edges of the Mellows Park for approximately 600m before crossing Finglas Road into St Margaret's Road where the new St Margaret's Tram stop will be located. A new substation will be built near the junction of Finglas Road and St Margaret's Road close to the location of the new St Margaret's Tram stop.

The Luas line continues from the Finglas Road junction along the eastern side of St. Margaret's Road, mainly off-road or segregated, until reaching the terminus stop located at Charlestown, within the southeastern quadrant of the road junction.

The results of the desktop survey are presented in Table 3.

SECTION 5: Results of the Desktop Survey

5.1 Table of Primary Identified Neighbours

Name	Description	Distance	Postcode	Address	
Maynooth Railway Line, Station and Depot	109m parallel running interface	<10m	D07 N4X0 D07 A978	Broombridge mainline railway, station and Luas Depot	5
Mobile Phone mast	Three, Meteor, Vodafone	23m		South West corner of Broombridge road & Royal Canal crossing	5
Substation and HV Tower	Substation and HV Tower	24m		South West corner of Broombridge road & Royal Canal crossing	5
HV Power Lines	Parallel HV Power lines for 1pprox.. 500m	50m		West – Parallel to Broombridge Rd	5
HV Power Lines	Crossing over tramway	<10m		Central part of park after crossing Ballyboggann Rd	5
Broombridge Business Centre	Other Commercial	35m	D07 PP9T	288 Bannow Rd, Cabra West, Dublin 7	3
Colorman (Ireland)	Commercial Printer	18m	D11 X064	Broombridge Industrial Estate, Broombridge Road, Cabra East, Dublin 11	4
Fashionflo Ltd	Screen Printer	16m	D11 V202	79 Lagan Rd, Dublin Industrial Estate, Dublin	4
Vemar Transport Irlanda	Transport Services	22m	D11 AX66	Cabra West, Dublin	3
Chloe's Kitchen	Takeaway	16m		Dublin Industrial Estate, Dublin 11	4
West Rock	Commercial Printer	<10m	D11 H277	84/85 Lagan Rd, Dublin Industrial Estate, Dublin	5
TJ'Omahony	DIY Superstore	18m	D11 H003	Ballyboggann Rd, Glasnevin, Dublin	4
Barnamore Grove	Residential	50m	D11 Y9P6	West of preferred route, Runs Parallel (257m)	2
Carrigallen Park	Residential	40m	D11 P5P5	East of preferred route	3
Finglas Youth Service	Youth Organisation	42m	-	The Scouts Den, St Helena's Rd, Finglas, Dublin	3

St Helena's Resource Centre	Education	52m	-	St Helena's Rd, Finglas, Dublin	3
St Helena's Child Care Centre	Education	20m	-	St Helena's Rd, Finglas, Dublin	4
Casement Rd	Residential	30m	D11 F5X4	West of preferred route, Runs parallel (134m)	3
Farnham Cres	Residential	24m	D11 N5P0	East of preferred route	3
Wellmount Parade	Residential	29m	D11 Y5R9	West of preferred route	3
Patrickswell Place	Residential	<10m	-	East of preferred route	4
Gary's Computer Repair Service	Computer Repair	37m	D11 HE16	Aylward Green, 4 Cappagh Rd, Finglas Dublin	4
Kingdom Hall Jehovahs Witnesses	Religious	43m	-	Cappagh Rd, Finglas South, Dublin	3
St Fergal's Boys National School	Education	62m	D11 E925	Cappagh Rd, Finglas West, Dublin	3
Cardiff Castle Road	Residential	18m	D11 E2V8	West of preferred route	3
Raven's Ct	Residential	<10m	D11 X4Y1	East of preferred route, Entry to court cut off by preferred route	4
BITACCRUAL	Investment	<10m	D01 B2CD	18 Raven's Court, Finglas North, Dublin	4
Finglas Garda Station	State Police	10m	-	Finglas North, Dublin	5
Mellow Spring Childcare Development Centre	Childcare Agency	23m	-	Finglas Civic Centre Complex, Mellowes Rd, Dublin	3
Finglas Sport and Fitness	Gym	20m	D11 E6K2	11 Mellowes Rd, Finglas West, Dublin	3
The Finglas Youth Resource Centre	Youth Organisation	17m		11 Mellowes Rd, Finglas West, Dublin	3
Finglas Fire Station	Fire Station	30m	D11 NR22	Mellowes Ave, Finglas, Dublin	5
North Road Motor Company	Used Car Dealer	<10m	D11 PX63	1 St Margaret's Rd, Northside, Dublin	5
Pizza Hut Delivery	Takeaway	<10m	D11 DX61	St Margaret's Rd, Finglas, Dublin	4
North Road	Residential	<10m	-	East side of preferred route	4

Lidl	Supermarket	53m	D11 YY11	11 StMargaret's Rd, Finglas North, Dublin	2
Murdock Builders Merchants Finglas	Building Materials	<10m	D11 K8KT	St Margaret's Rd, Finglas, Dublin	5
Atlas Autoservice and Tyres	Vehicle Repair	27m	D11 PX63	1 St Margarets Rd, Finglas East, Dublin	4
Industrial Estate	Misc Units	-	-	St Margaret's Road	4
Manhattan Peanuts Limited	Manufacturer	13m	D11 F654	McKee Ave, Finglas, Dublin	4
Aldi Stores	Supermarket	26m	-	11 Finglas Rd, Finglas North, Dublin	3
Polonez Finglas	Supermarket	19m	D11 KX79	Saphire Lingerie LTD, St Margaret's Rd, Finglas East, Dublin 11	3
Auto Expert Garage	Mechanic	32m	-	Unit 1 St Margaret's Rd, Jamestown Rd, Finglas, Dublin	4
Finglas Auto Parts	Auto Parts Store	<10m	D11 YY11	11 St Margaret's Road, Finglas, Dublin	5
St Margaret's Road	Residential	25m		East and West of St Margaret's Road	3
VanSigns Ltd	Corporate Office	17m	-	St Margaret's Rd, Finglas, Dublin	4
ESB Networks	Electric Utility Company	40m	D11 X3W7	St Margaret's Rd, Finglas North, Dublin	4
Mc Kelvey Celtic AFC	Football Club	50m	-	St Margaret's Rd, Finglas, Dublin	3
EVE Castlview	Disability Services Organisation	<10m	D11 KA03	Century Business Park, Unit 1A, St Margaret's Rd, Finglas, Dublin 11	4
Century Day Hospital	Hospital	<50m	-	Charleston Dublin	4
Connect Electronics Ltd	Industrial Equipment Supplier	12m	-	Unit 2A Centuy Business Park, St Margaret's Rd, Finglas North, Dublin	4
Charlestown Shopping Centre	Shopping Centre	63m	D11 YY11	St Margaret' Rd, Finglas North, Dublin	2
Mobile Phone mast	Meteor, Vodafone, Three	126m		North West corner of Charlestown intersection, on top of Charlestown shopping centre	4

Table 3 - Results of the Desktop Survey

5.2 Outcome of the Survey

The scoring of the identified neighbours in Table 3 above provides a guide as to where further survey work and potential mitigation measures may be required. In some cases, this is likely to be fairly straight forward. For example, some premises have been scored as a 5 due to the close proximity to the tramway (<10m), however it is likely that once it is confirmed that they contain nothing unusual or sensitive from an EMC perspective these scores can be downgraded. An example of these are:

- Finglas Auto Parts
- Murdock Builders Merchants
- North Road Motor Company
- TJ'Omahony DIY Superstore

The other items scored as 5 in the above table does provide a clear requirement for further work – either more detailed survey work (measurements survey proposed in the next stage of the work, see Section 6.2), or simulation work to identify the level of touch potential that might be induced into the tramway. The simulation work involves modelling the overhead lines in terms of load, balance, fault conditions, length of parallelism with the tramway and other parameters. It will calculate the level of induced voltage that could be impressed onto the new tramway to ensure it meets safety limits for staff and public, or may direct suitable measures in design, build and operation to mitigate any risk.

A walkthrough survey will be carried out to identify suitable measurement locations and refine the list below. For example, a suitable location may be identified that captures emissions from both the mobile phone mast at Broombridge as well as the railway station and depot. Other locations might be identified that were not obvious from the Google survey. The walkthrough survey will also identify any access issues that may need to be arranged for the actual measurements survey. The locations identified from the desktop survey are:

- Maynooth Railway Line, Station and Depot
- Mobile Phone mast - South West corner of Broombridge road & Royal Canal crossing
- Finglas Garda Station - State Police
- Finglas Fire Station (also the site of new substation)
- Finglas Road/St Margaret's Road new substation

Radiated emission measurements based on the requirements of EN50121-2 will be carried for the frequency range 9kHz to 6GHz at the above locations

- Substation and HV Tower - South West corner of Broombridge road & Royal Canal crossing
- HV Power Lines – West & Parallel to Broombridge Rd
- HV Power Lines - Central part of park after crossing Ballyboggann Rd

The locations above require simulation modelling (to be carried out at a later stage) although limited EMF measurements will be carried out to measure field levels at 50Hz below the grid lines during the measurements survey.

- New substation location close to Finglas Fire Station
- New substation close to the junction of Finglas Road and St Margaret's Road

Ground resistivity measurements will be carried out at the proposed new substation locations.

The remainder of the identified neighbours in Table 3 which are scored 4 and below will be managed by ensuring that the new tramway complies with the top level EMC requirement for the project which will include compliance with EN50121-2 as well as the all the usual EMC management

procedures. This includes compliance of all constituent parts with appropriate EMC standards as well as good EMC installation practice.

SECTION 6: Conclusions

6.1 Summary of Survey Results

From the desktop survey of the route the main features identified that could be affected by EMC are:

- Interface with Maynooth Railway line and Luas Depot
- Parallel running with the overhead HV line. This could cause induced voltages into the tram conductors.
- Crossing the overhead HV line. Depending on the separation distance between the tram and overhead line passengers and staff could be exposed to excessive EMFs from the HV line.
- Running close to the Finglas Garda Station and its associated radio equipment. The tram could cause interference to the Garda radio systems and the Garda radio transmitters could cause interference to the tram and wayside equipment.
- Running close to the Finglas Fire Station and its associated radio equipment. The tram could cause interference to the Fire Station radio systems and the Fire Station radio transmitters could cause interference to the tram and wayside equipment.
- One of the new substations is to be located close to the Finglas Fire Station.
- A new substation will be built near the junction of Finglas Road and St Margaret's Road

An EMI survey (9kHz to 6GHz) will be carried out at four locations (to be confirmed during walkthrough survey):

1. Close to Broombridge Station, Luas Depot and the mainline railway
2. Close to the Finglas Garda Station
3. Close to the Finglas Fire Station & site of a new substation
4. Close to the site of the new substation near the junction of Finglas Road and St Margaret's Road.

A soil resistivity survey will be carried out at the new substation locations:

5. Substation location beside Finglas Fire station
6. Substation close to junction Close to Finglas Road and St Margaret's Road

Limited 50Hz EMF measurements will be made under the grid lines:

7. Substation and HV Tower - South West corner of Broombridge road & Royal Canal crossing
8. HV Power Lines – West & Parallel to Broombridge Rd
9. HV Power Lines - Central part of park after crossing Ballyboggann Rd

6.2 Next Steps

As a follow on from this desktop survey the following work will be carried out:

- A line of route site visit walk will be carried out prior to the measurements survey to identify exact locations where measurements will be carried out. This may refine the proposed locations above to better locations that become evident when on site. It may identify additional locations that would be useful to survey but were not obvious from the desktop survey. It will allow any access issues to be identified that will need to be sorted prior to the measurements survey, for example access to the land we will be carrying out soil resistivity surveys.
- EMC simulation studies (to determine maximum induced voltages from HV power lines into the tramway). Note: this is outside of the scope of the measurements survey and will be agreed and carried out at a later date.

