CLV CONSULTING

TECHNICAL REPORT

LIDL RETAIL STORE EXPANSION
NOISE IMPACT ASSESSMENT
NEWCASTLE, CO. DUBLIN

For:
The Planning Partnership
The Coach House
Dundanion
Blackrock
Cork

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1.0 INTRODUCTION

LIDL Ireland GmbH has applied for planning permission for the construction of a new Discount Foodstore Supermarket with ancillary off-licence sales at Main Street Upper, Newcastle, Co. Dublin. The proposed development comprises:

1) The construction of a single storey Discount Foodstore Supermarket with ancillary off-licence use (with mono-pitch roof and overall building height of c. 6.74 metres) measuring c. 2,207 sqm gross floor space with a net retail sales area of c. 1,410 sqm;

2) Construction of a vehicular access point to Main Street Upper and associated works to carriageway and including partial removal of boundary wall / façade, modification of existing footpaths / public realm and associated and ancillary works including proposed entrance plaza area;

3) Demolition of part of an existing rear / southern single storey residential extension (and related alterations to remaining structure) of 'Kelly Estates' building. The original 'Kelly Estates' building (a protected structure - Eircode: D22 Y9H7) will not be modified;

4) Demolition of detached single storey accommodation / residential structure and ancillary wall / fence demolitions to rear of existing 'Kelly Estates' building;

5) Demolition of existing single storey (stable) building along Main Street and construction of single storey retail / café unit on an extended footprint measuring c. 118 sqm and associated alterations to existing Main Street boundary façade;

6) Renovation and change of use of existing (vacant) two storey vernacular townhouse structure to Main Street, and single storey extension to rear, for retail / commercial use (single level throughout) totalling c. 61 sqm;

7) Repair and renewal of existing Western and Eastern 'burgage plot' tree and hedgerow site boundaries; and,

8) Provision of associated car parking, cycle parking (and staff cycle parking shelter), pedestrian access routes and (ramp and stair) structures (to / through the southern and western site boundaries to facilitate connections to potential future development), free standing and building mounted signage, free standing trolley bay cover / enclosure, refrigeration and air conditioning plant and equipment, roof mounted solar panels, public lighting, hard and soft landscaping, boundary treatments and divisions, retaining wall structures, drainage infrastructure and connections to services / utilities, electricity Substation and all other associated and ancillary development and works above and below ground level including within the curtilage of a protected structure.

In support of the planning application for this development, LIDL has commissioned CLV Consulting to conduct an assessment into the likely noise impact associated with this proposed development. The proposed opening hours of the store are as follows:

Mon - Sat 8am - 10pm

Sun & Bank / Public Holidays 9am - 9pm

This report assesses the potential noise and vibration impacts associated with the development on the surrounding environment.

2.0 PROPOSED DEVELOPMENT LOCATION & LAYOUT

As stated in the Introduction section, the proposed development is a LIDL Discount Foodstore located in the Newcastle village centre in southwest County Dublin. The proposed site is bordered to the north by a Community Hall and a residential apartment building (across Main Street), to the east by a childcare building, to the west by a greenfield site with residential dwellings lining St. Finian's Way on the other side and to the south by existing greenfield sites. However, there will be a new residential development that is currently planned for future development to the south of the development on these greenfield sites.

The nearest noise sensitive receptors to the proposed development are the residential apartment building across Main Street to the north, the detached dwelling adjoining the eastern boundary, the dwellings located along St. Finian's Way to the west and the future development dwellings to the south. Each of the nearest noise sensitive receptors in each direction is listed along with their approximate distances away from the proposed development boundary as follows:

Main Street Apartment Building to North	22m
Childcare Building to East	8m
St. Finian's Way Dwellings to West	50m
Future Development Dwellings to South	25m

See Figure 1 below.

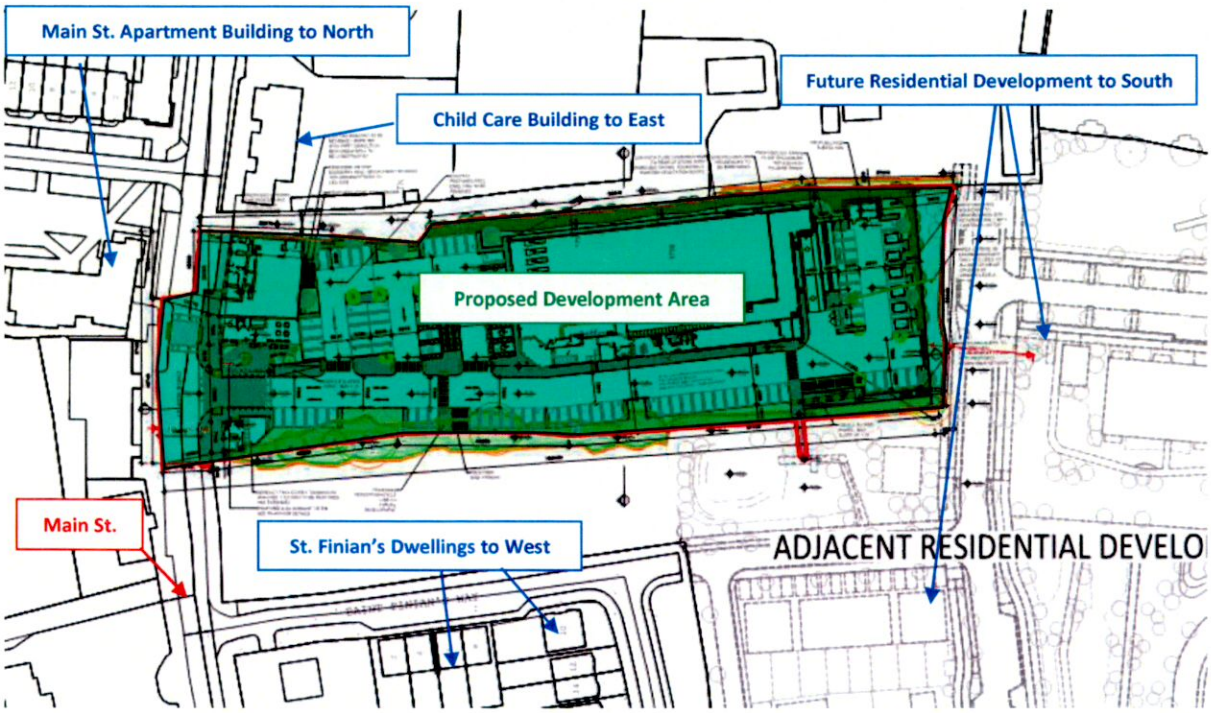

Figure 1 Proposed Development Location & Nearest Noise Sensitive Receptors

A layout of the proposed development is provided in Figure 2 on the following page.

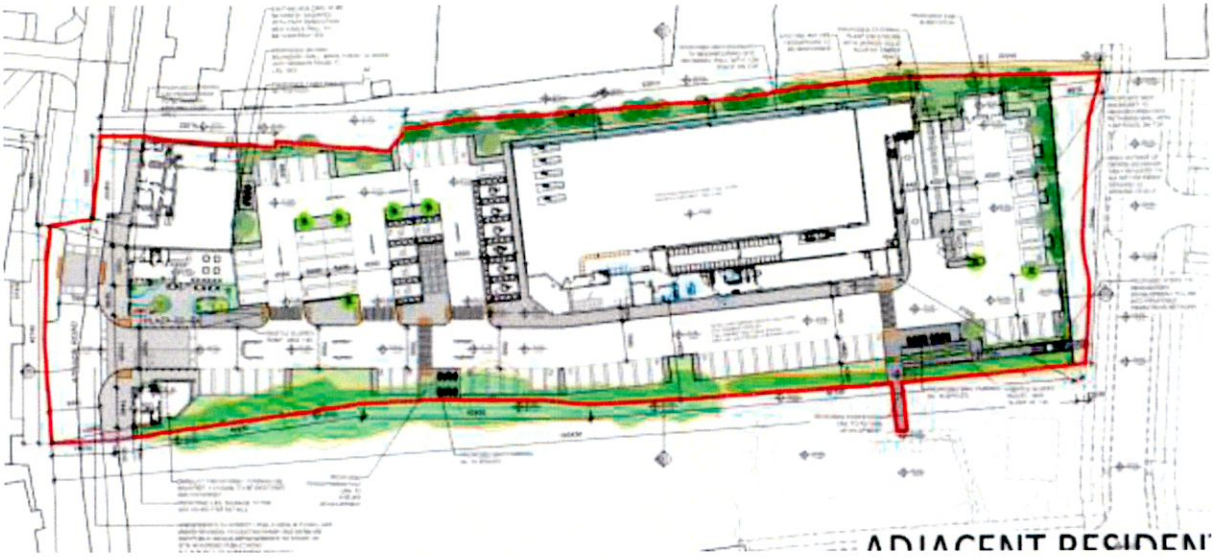

Figure 2 Proposed LIDL Store Development Layout

It is also important to note, from a noise emission standpoint, that ground level for the proposed development will locate below the southern boundary by a distance of the order of 2m which will provide a significant degree of acoustic shielding from the future residential development to the south. See Figure 3 below.

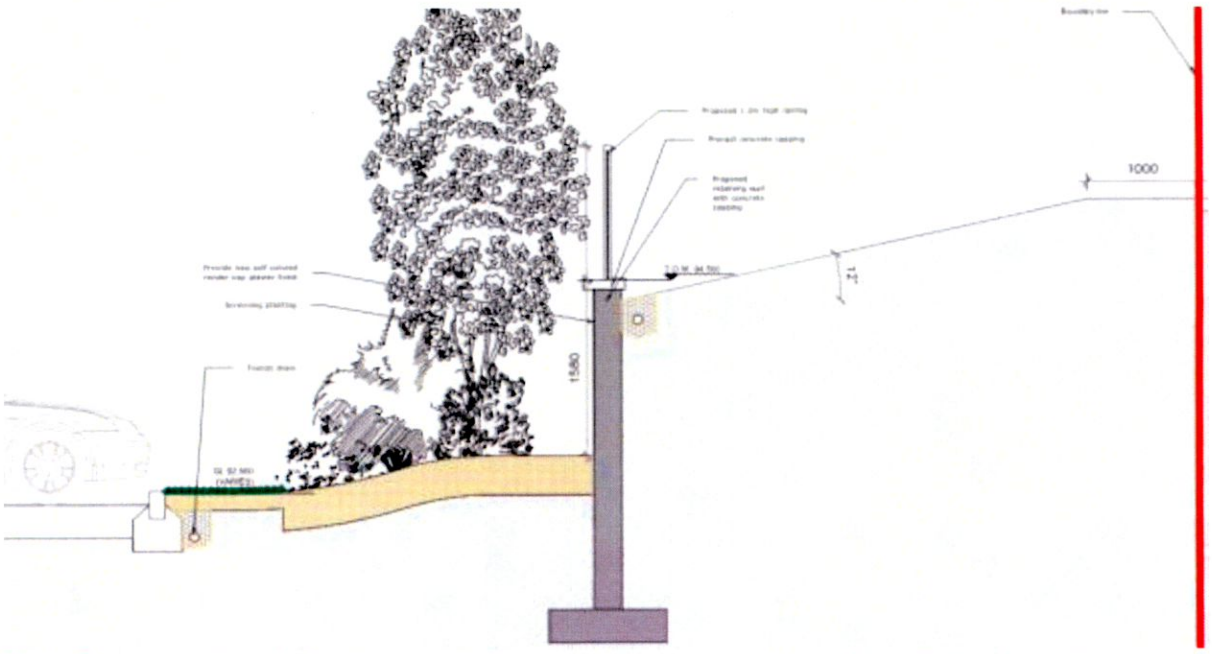

Figure 3 Section through Development Southern Boundary Showing Lower Height & Boundary Wall

The western boundary of the proposed development will similarly have a fairly considerable (but a lesser degree of) screening from a perimeter earth bund and hedging that will run along it. See Figure 4 on the following page.

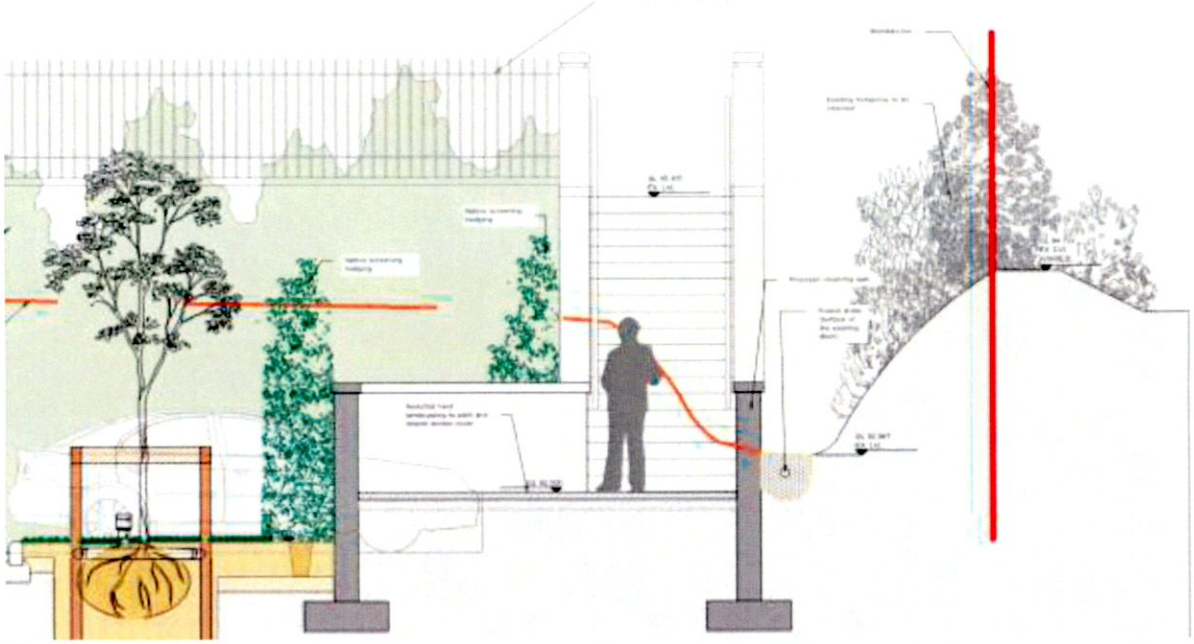

Figure 4 Section through Development Western Boundary Showing Perimeter Earth Bund & Hedge Row

It should be noted that, although there are currently no noise sensitive receptors located in close proximity to the east of the development, the proposed boundary retaining wall and perimeter hedging should serve to 'future proof' areas to the east from development noise emissions (should these areas ever be developed) in addition to the retail building itself.

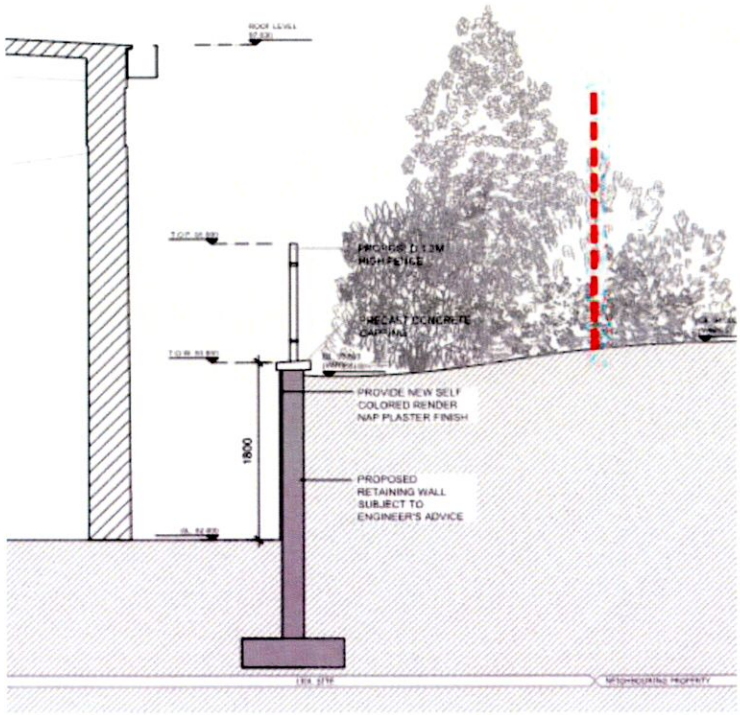

Figure 5 Section through Development Eastern Boundary Showing Perimeter Earth Bund & Hedging

3.0 RECEIVING ENVIRONMENT

In order to assess the potential for noise impact on the proposed development surroundings, a visual survey of the area was firstly conducted in order to identify all existing noise sensitive locations in the vicinity of the development. An environmental noise survey was then conducted in order to quantify the existing noise environment in this area.

The survey was conducted in general accordance with *ISO 1996-2: 2017: Acoustics - Description, measurement and assessment of environmental noise* and the EPA's *Guidance Note for Noise: Licence Applications, Surveys and Assessments in relation to Schedules Activities (NG4).*

Specific details of these surveys are set out in the following sections.

3.1 Choice of Measurement Locations

Two measurement locations were selected; each is described in turn below and shown in Figure 6 on the following page.

Location 1 is located in the vicinity of the residential apartment building along Main Street. Levels measured at this location would be indicative of those at both the apartment building to the north of the proposed development and the child care building located on the other side of the street (to the east of the proposed development).

Location 2 is located in the vicinity of the residential dwellings to the west of the proposed development along St. Finian's Road.

Location 3 is located in the existing greenfield site at the southwest corner of the site in the vicinity of the future proposed development.

3.2 Survey Periods

Noise measurements were conducted over the course of two survey periods as follows:

- Daytime 10:40 to 14:15 hrs 19 May 2022;
- Night-time 23:00 to 02:15 hrs 19 / 20 May 2022.

The daytime measurements occurred during a period that was selected in order to provide a typical snapshot of the existing noise climate, with the primary purpose being to ensure that the proposed noise criteria associated with the development are commensurate with the prevailing environment. The night-time period measurements provide a measure of the existing background noise levels.

The weather during the daytime survey period was 15 - 17°C, partly cloudy with a slight south westerly wind. The weather during the night time survey period was 11°C, mostly cloudy and calm.

3.3 Personnel & Instrumentation

Brian S. Johnson (CLV) conducted the noise level measurements during all survey periods. He is an internationally experienced acoustic consultant who has been working in the fields of architectural / building acoustics and noise control since 1994. He has been based in America, Europe, Asia and Australia and is a member of the Institute of Acoustics. Brian also has extensive knowledge in the field of environmental acoustics and holds a Certificate of Competence in Environmental Noise Measurements from the Institute of Acoustics.

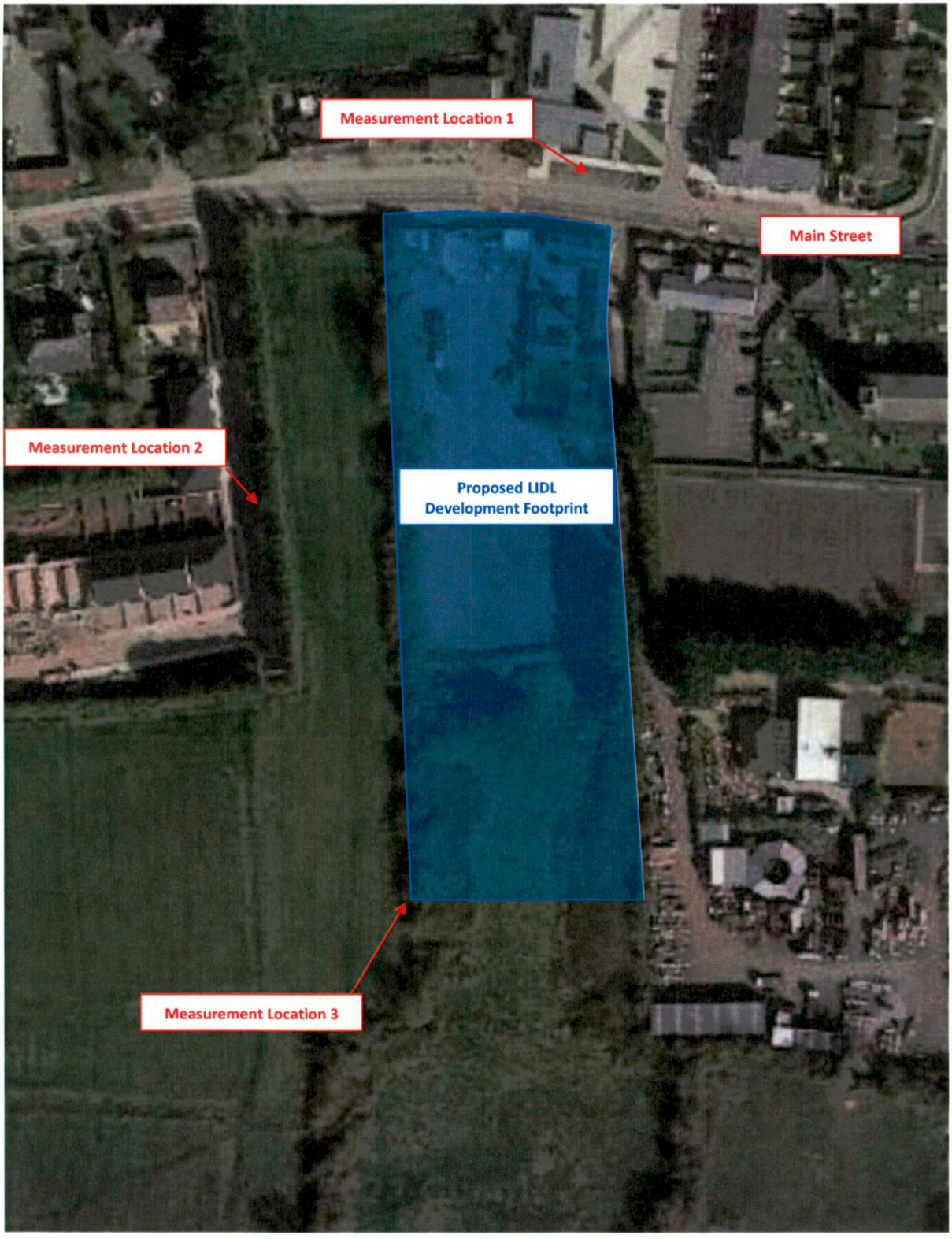

Figure 6 Site Layout Showing Approximate Positions of Measurement Locations

The measurements were conducted using an NTI Audio type XL2 Sound Level Meter (Serial #A2A-11070-EO). It was fitted with a 90mm windshield and before and after the survey the measurement apparatus was check calibrated using a Casella CAL 200 Acoustic Calibrator (Serial #18882). The microphone was positioned approximately 1.4m above the ground.

The calibration certificates for the sound level meter and acoustic calibrator are provided in Appendices A & B respectively of this document.

3.4 Procedure

Measurements were conducted at Locations 1 & 2 on a cyclical basis. Sample periods for the noise measurements were 15 minutes during both the daytime and night-time periods. The results were saved to the instrument memory for later analysis. All primary noise sources contributing to noise build-up were also noted.

3.5 Measurement Parameters

The noise survey results are presented in terms of the following five parameters:

L_{Aeq} is the equivalent continuous sound level. It is a type of average and issued to describe a fluctuating noise in terms of a single noise level over a sample period.

L_{Amax} is the instantaneous maximum sound level measured during the sample period.

L_{Amin} is the instantaneous minimum sound level measured during the sample period.

L_{A10} is the sound level that is exceeded for 10% of the sample period.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

3.6 Measurement Results

Location 1

The survey results for Location 1 are summarised in Table 1 below.

Time		Measured Noise Levels (dB re. $2x10^{-5}$ Pa)				
		L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
Daytime	10:40 - 10:55 hrs	**65**	75	46	69	51
	12:10 - 12:25 hrs	**65**	80	47	69	49
	13:20 - 13:35 hrs	**62**	76	43	67	46
Night-time	23:00 - 23:15 hrs	**45**	74	35	48	39
	00:05 - 00:20 hrs	**43**	70	34	48	38
	01:15 - 01:30 hrs	**41**	69	35	47	37

Table 1 Summary of Measured Noise Levels at Location 1

During daytime monitoring periods, the dominant sources of noise noted in the area was traffic along Main Street. There were also contributions from periodic car parking and pedestrian events and birdsong. Daytime noise levels were in the range of 62 to 65dB L_{Aeq} and 46 to 51dB L_{A90}.

The night-time noise measurements at this location were again dominated by intermittent road traffic events along Main Street. There were also some minor contributions from building services noise and distant road hum. Noise levels were in the range of 41 to 45dB L_{Aeq} and 37 to 39dB L_{A90}.

Location 2

The survey results for Location 2 are summarised in Table 2 below.

Time		Measured Noise Levels (dB re. $2x10^{-5}$ Pa)				
		L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
Daytime	11:05 - 11:20 hrs	**49**	67	35	51	40
	12:30 - 12:45 hrs	**45**	60	34	48	38
	13:40 - 13:55 hrs	**45**	56	34	49	37
Night-time	23:20 - 23:35 hrs	**40**	60	31	42	33
	00:25 - 00:40 hrs	**37**	49	29	40	31
	01:35 - 01:50 hrs	**36**	51	29	38	31

Table 2 Summary of Measured Noise Levels at Location 2

During daytime monitoring periods, the dominant source of noise noted in the area was traffic along Main Street and occasional intermittent events along St. Finian's Road. There were also contributions from birdsong and low levels of wind generated noise. Daytime noise levels were in the range of 45 to 49dB L_{Aeq} and 37 to 40dB L_{A90}.

The night-time noise measurements at this location were again dominated by intermittent road traffic events along both Main Street and St. Finian's Way. There were also some low level contributions from wind generated noise. Noise levels were in the range of 36 to 40dB L_{Aeq} and 31 to 33dB L_{A90}.

Location 3

The survey results for Location 3 are summarised in Table 3 below.

Time		Measured Noise Levels (dB re. $2x10^{-5}$ Pa)				
		L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
Daytime	11:30 - 11:45 hrs	**46**	62	34	48	40
	12:55 - 13:10 hrs	**44**	59	34	49	41
	14:00 - 14:15 hrs	**45**	58	35	49	40
Night-time	23:45 - 00:00 hrs	**41**	61	25	43	26
	00:50 - 01:05 hrs	**39**	58	25	41	26
	02:00 - 02:15 hrs	**38**	55	24	40	25

Table 3 Summary of Measured Noise Levels at Location 3

During daytime monitoring periods, the dominant source of noise noted in the area was distant traffic along Main Street and occasional intermittent events along St. Finian's Road. There were also contributions from birdsong and wind generated noise. Daytime noise levels were in the range of 45 to 46dB L_{Aeq} and 40 to 41dB L_{A90}.

The night-time noise measurements at this location were again dominated by intermittent road traffic events along both Main Street and St. Finian's Way. Noise levels were in the range of 38 to 41dB L_{Aeq} and 25 to 26dB L_{A90}.

4.0 NOISE EMISSION CRITERIA

4.1 Construction Phase Noise Criteria

There is no published statutory Irish best practice guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project (other than for roadways). Local authorities normally control construction activities by imposing limits on the hours of operation and may consider noise limits at their discretion.

In the absence of specific noise limits, appropriate criteria relating to permissible construction noise levels for a development of this scale may be found in the British Standard *BS 5228 - 1: 2009+A1: 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Part 1: Noise*.

The approach adopted here calls for the designation of a noise sensitive location into a specific category (A, B or C) based on exiting ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded, indicates a significant noise impact is associated with the construction activities.

Table 4 below sets out the values which, when exceeded, indicate a significant effect at the facades of residential receptors as recommended by *BS 5228 - 1*. Please note that these are cumulative levels, i.e. the sum of both ambient and construction noise levels.

Assessment Category & Threshold Value Period (L_{Aeq})	Threshold Value, Decibels (dB)		
	Category A [A]	Category B [B]	Category C [C]
Night-Time (23:00 to 07:00hrs)	45	50	55
Evenings & Weekends [D]	55	60	65
Daytime (07:00 - 19:00) & Saturdays (07:00 - 13:00)	65	70	75

Table 4 Example Threshold of Significant Effect at Dwellings

A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

D) 19:00 - 23:00 weekdays, 13:00 - 23:00 Saturdays and 07:00 - 23:00 Sundays.

For the appropriate period (e.g. daytime), the ambient noise level is determined and rounded to the nearest 5dB.

In this instance, daytime ambient noise levels measured at the apartment building located along Main Street to the north were in the range of 62 to 65dB L_{Aeq}. This apartment building

would therefore be assigned a Category B designation (along with the child care building as a worst case consideration). The daytime ambient noise levels measured in the vicinity of the remaining existing and future residential dwellings / areas bordering the proposed development were in the range of 36 to 41dB L_{Aeq}. These buildings / areas would therefore be assigned a Category A designation and we would also recommend that construction works are not carried out during night time periods.

The maximum daytime criteria limits in Table 5 will therefore be applied at the adjacent boundaries in respect of construction noise emissions from the proposed development. If the total noise level (i.e. construction noise plus existing ambient noise level) exceeds the appropriate category values then a relative noise impact is deemed to have occurred.

Adjacent Noise Sensitive Receptor Location	Threshold Value, Decibels (dB L_{Aeq})		
	Daytime Periods (07:00 - 19:00) & Saturdays (07:00 - 13:00)	Evening Periods* 19:00 - 23:00 Weekdays 13:00 - 23:00 Saturdays & 07:00 - 23:00 Sundays	Night Periods* (23:00 to 07:00hrs)
Main Street Apartment & Child Care Buildings	70	60	50
All Other Residential Dwellings / Areas	65	55	-

Table 5 Established Threshold / Maximum Construction Noise Criteria Limits for Proposed Development

* Note: Construction activity at these times, other than that required for emergency works, will normally require the explicit permission of the relevant local authority.

The levels set out in Table 4 are also generally consistent with the levels recommended in BS 5228-1:+A1:2014 (*Code of practice for noise and vibration control on construction and open sites Part 1: Noise)* for setting limits for noise emissions from a construction site.

4.2 Operational Phase Noise Criteria

Due consideration must be given to the nature of the primary noise sources when setting noise emissions criteria. In this instance, there are four primary sources of noise associated with the development once operational. Criteria for noise from all of these sources, will be considered in terms of the $L_{Aeq,T}$ parameter (the equivalent continuous sound level).

There is no Irish Standard containing guidance for appropriate noise limits for retail / supermarkets in this instance. In the absence of such standards, best practice dictates that the potential noise impact of the proposed development is assessed against appropriate British and/or International Standards.

Appropriate guidance is contained within *BS 8233 (2014): Guidance on Sound Insulation and Noise Reduction for Buildings*. This British Standard sets out recommended noise limits for indoor ambient noise levels in residential dwellings as detailed in Table 6 below.

Activity	Room Type	Design Criterion $L_{Aeq,T}$ (dB)	
		Daytime (07:00 - 23:00hrs)	Night Time (23:00 - 07:00hrs)
Resting / Sleeping Conditions	Living Rooms	35dB $L_{Aeq,16hr}$	-
	Bedrooms	35dB $L_{Aeq,16hr}$	30dB $L_{Aeq,8hr}$

Table 6 Recommended Indoor Ambient Noise Levels from *BS8233 (2014)*

For the purposes of this assessment, it is necessary to derive external limits based on the internal criteria noted in the paragraph above. This is done by factoring in a degree of noise reduction afforded by an open window, which is defined in the standard as being 15dB.

Applying the 15dB factor to the values from the BS8233 table, the following criteria would apply at the façades of the adjacent dwellings:

- ***Daytime (07:00 to 23:00 hours)*** ***50dB $L_{Aeq,16hr}$***
- ***Night-time (23:00 to 07:00 hours)*** ***45dB $L_{Aeq,8hr}$***

These criteria are consistent with the following guidance taken from the World Health Organisation publication "Community Noise":

> *To protect the majority of people from being moderately annoyed during the daytime, the sound pressure level should not exceed 50dB L_{Aeq}.*
>
> *At night, external sound pressure levels should not exceed 45dB L_{Aeq}, so that people may sleep with bedroom windows open.*

In consideration of the adjacent child care building, there is no specific criteria guidance contained in in BS 8233. However, given the relatively similar acoustic sensitivity to a residential dwelling, we have applied the same criteria as a worst case consideration.

In order to also assist with the interpretation of the noise associated with changes in noise level, Table 7 below offers guidance as to the likely impact associated with any particular relative change.

Change in Sound Level (dB L_{Aeq})	Subjective Reaction	Impact
< 3	Inaudible	Imperceptible
3 - 5	Perceptible	Slight
6 - 10	Up to a doubling of loudness	Moderate
11 - 15	Over a doubling of loudness	Significant
> 15		Profound

Table 7 Likely Impact Associated with Change in Noise Level

5.0 PREDICTED NOISE IMPACT

When considering a development of this nature, the potential noise impact on its surroundings must be considered for each of two stages: the short-term impact of the construction phase and the longer term impact of the operational phase. Given the nature of this development, it is unlikely that there will be any significant overlap of these phases.

In order to assess the potential for noise impacts from the development during both phases, the following prediction methodology was adopted:

- ✓ Noise measurements were conducted at the nearest identified noise sensitive receptors in order to quantify the ambient noise level environment in the vicinity of the proposed development (refer to Section 3.0).

- ✓ The measured ambient noise levels were used to establish construction maximum noise emission criteria limits and also for comparison purposes with operational noise emissions to confirm that development noise emissions will be below the existing ambient noise levels in the vicinity of the proposed development once operational (refer to Section 4.0).
- ✓ Construction noise emission levels were calculated in accordance with BS 8233:2014 at each of the nearest noise sensitive receptors based on sound power / pressure levels for expected equipment / processes and estimated utilisation periods along with standard appropriate corrections for attenuation with distance, screening from buildings / perimeter site hoarding and the presence of nearby reflecting surfaces (refer to Section 5.1).
- ✓ Operational noise emission levels were calculated in accordance in a similar fashion at each of the nearest noise sensitive receptors based on all identified operational noise source sound power / pressure levels along with standard appropriate corrections for attenuation with distance, screening from buildings / perimeter site hoarding and the presence of nearby reflecting surfaces (refer to Section 5.2).
- ✓ The cumulative results of these operational calculations were then used to assess the potential for a noise impact based on a comparison with both criteria limits and existing ambient noise levels at the nearest noise sensitive receptors (refer to Section 5.2).

All noise prediction calculations were conducted in general accordance with ISO 9613: *Acoustics - Attenuation of sound outdoors, Part 2: General method of calculation, 1996.*

5.1 Construction Phase

A variety of plant items will be in use such as lifting equipment, dumper trucks and general construction plant items. There will be vehicular movements to and from the site that will make use of existing roads and will be a source of noise emissions.

Table 8, on the following page, indicates typical noise levels that would be expected from the proposed construction site during the various phases of the construction project.

The following additional assumptions have been made in the preparation of these construction noise prediction calculations:

- utilisation of equipment of 75% over a working day;
- the site will be surrounded by a 2.4m high solid hoarding.

Phase	Plant Item (BS 5228 Ref)	At 10m (dB) [1]	Predicted Noise Level (dB L_{Aeq})			
			Apt Bldg to North	Child Care Bldg to East	Existing Dwellings to West	Future Dwellings to South
Excavation / Site Preparation	Tracked excavator (C3.92)	76	53	58	58	52
	Dumper (C3.100)	74				
Foundation Laying	Compressor (C6.19)	72	52	57	57	51
	Poker Vibrator (C6.40)	73				
	Cement Mixers (C6.6)	71				
Steel Erection	Crane (C7.120)	76	52	60	60	51
	Lorry (C7.121)	70				
General Construction	Compressor (C7.70)	70	54	62	62	53
	Diesel Hoist (C7.97)	73				
	Pneumatic Circular Saw (C.79)	75				
	Generator (C7.51)	72				
Roadworks	Surfacing	73	58	63	56	54

Table 8 Predicted Noise Emission Levels at Nearest NSRs During Construction Phases

As confirmed by the prediction results detailed in the table above, all of the noise level emissions from the proposed development construction activities would be within the limits outlined in Table 4 and would not be considered out of the ordinary for construction activities. The predicted noise levels do not exceed the worst case adopted criterion of 65dB L_{Aeq} for construction activities at the facades of any of the nearby residential dwellings (and child care building) during any of the construction phases.

Note that noise impacts from the Demolition phase were not assessed given their very limited duration. However, in this instance, there is the possibility of a potential impact on commercial tenants of the Kelly's Estates building given that portions of the building's extensions are to be demolished. We would therefore only recommend that demolition works are coordinated with Kelly's Estates in order to ensure as minimal disruption as possible and that the recommended guidance for reducing construction noise emissions in Section 6.1 is followed in order to ensure that Demolition Phase noise emissions are reduced as far as practical.

The only additional measures we would recommend are that construction works are restricted to daytime periods only (as a good neighbourly measure) and that the recommended guidance for reducing construction noise emissions in Section 6.1 is followed in order to ensure that residual noise emissions are reduced as far as practical.

[1] Sound data from BS5228-1:2009+A1:2014 *Code of practice for noise and vibration on construction and open sites*.

5.2 Operational Phase

There are four principal sources of noise which are expected to arise during the operational phase of the proposed development:

- Building Services Plant
- Delivery Truck Events
- Car Parking
- Additional Vehicular Traffic on Public Roads

Car parking, delivery truck events and additional vehicular traffic on public roads were all considered during daytime periods; however, building services plant will run continuously and therefore has been assessed for both daytime and night-time periods. Each one of these potential sources of noise is considered in turn in the following sections.

Note that the proposed opening hours of the store are 8am to 10pm Mondays to Saturdays and 9am to 9pm on Sundays & Bank / Public Holidays.

5.2.1 Building Services Plant

Subsequent to the construction of the development, there will be various electrical and mechanical plant operating to service the proposed retail unit, e.g. heating/refrigeration plant, pumps etc. Most of this plant will be capable of generating noise to some degree. Some of this plant may operate 24-hours a day and would therefore be more noticeable during quiet periods (night-time in this instance).

The building services plant for the proposed development will be located externally on the roof of the northeast corner of the building (above the delivery bay) as shown in Figure 7 below. Note that there will be 2m high boundary walls enclosing this area to shield this external plant area (as well as the delivery bay area) from the nearest noise sensitive receptors, in addition to the shielding provided by the southern boundary wall and western boundary earth bund.

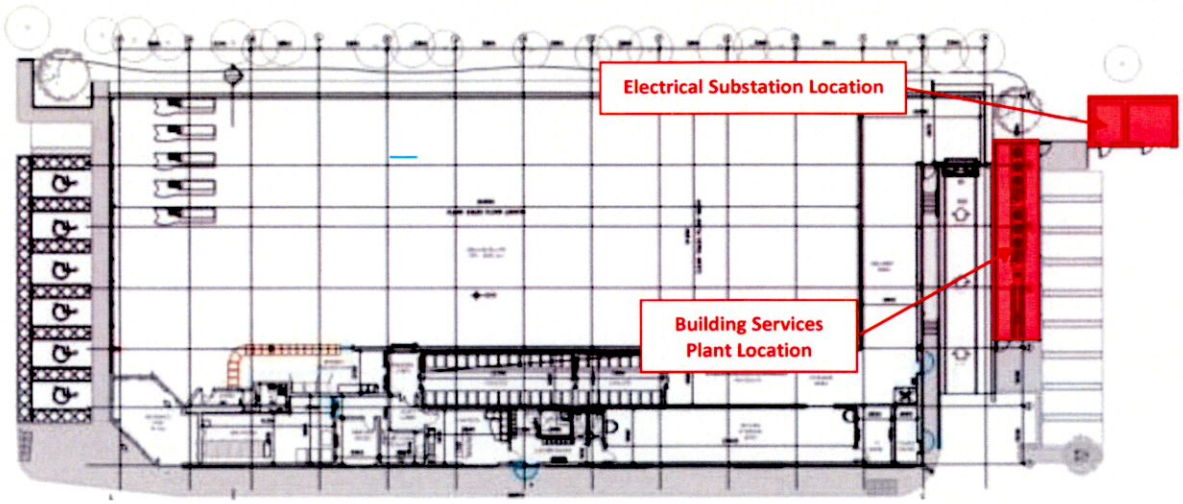

Figure 7 External Plant Locations

A layout drawing of the external plant area is provided in Figure 8 on the following page.

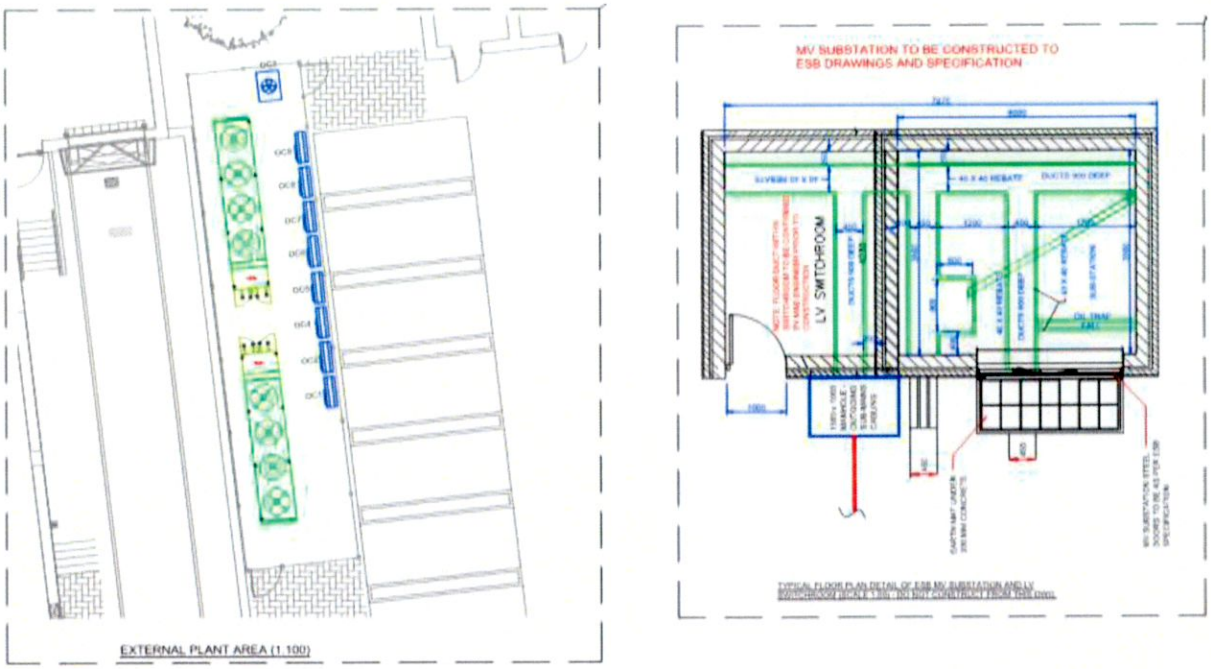

Figure 8 External Plant Area Layouts

The proposed plant for the mechanical room and the noise levels for each (provided by the manufacturer) is listed in Table 9 below.

Unit Ref.	Mechanical Plant	Model	No. Of Units	Noise Level Emissions (dB SPL)
AC 1 & AC2	Wall Mounted A/C Unit w/ Condensate Pumps	MITSUBISHI PKA-M100KA	2	59dB(A) @ 1m (cooling) 62dB(A) @ 1m (heating)
AC 3 & AC4	Ceiling Concealed A/C Unit w/ Condensate Pumps	MITSUBISHI PEAD-M100-JA C/W	2	59dB(A) @ 1m (cooling) 62dB(A) @ 1m (heating)
AC 05	Ceiling Mounted A/C Unit w/ Condensate Pumps	MITSUBISHI PLFY-M32VEM-E	1	59dB(A) @ 1m
AC 06	Ceiling Mounted A/C Unit w/ Condensate Pumps	MITSUBISHI PLFY-M32VEM-E	1	59dB(A) @ 1m
AC 07	Wall Mounted A/C Unit w/ Condensate Pumps	MITSUBISHI PLFY-M50VEM-E	1	59dB(A) @ 1m
AC 08	Wall Mounted A/C Unit w/ Condensate Pumps	MITSUBISHI PLFY-M100KA	1	49dB(A) @ 1m (cooling) 51dB(A) @ 1m (heating)
AC 09	Wall Mounted A/C Unit w/ Condensate Pumps	MITSUBISHI PLFY-M100KA	1	49dB(A) @ 1m (cooling) 51dB(A) @ 1m (heating)
DX 1	AHU DX Coil - External Condenser Units	PUHZ-ZRP250YKA3	1	59dB(A) @ 1m (cooling)
DAC 01	Refrigeration Dry Air Coolers		2	42dB(A) @ 5m)
Electrical Substation	Transformers	To Be Selected		55dB(A) @ 1m[2]

Table 9 External Plant Mechanical Room Noise Levels

[2] Note that noise data for the transformers have been used as indicative. These transformers will be enclosed within the substation so may not even be audible above the ambient in areas adjacent to the substation.

Taking into consideration the noise levels in Table 9 along with the appropriate corrections for distance, screening, and the presence of nearby reflecting surfaces, the resultant noise levels at the façades of the nearest noise-sensitive locations have been calculated and are predicted to be as follows:

- Apartment Building to the North < 10dB L_{Aeq}
- Child Care Building to the East 10dB L_{Aeq}
- Existing Dwellings to the West 25dB L_{Aeq}
- Future Dwellings to the South 29dB L_{Aeq}

The predicted noise levels at the nearest noise sensitive receptors are predicted to be in the range of 8 to 29dB $L_{Aeq,15min}$ which is lower than the daytime and night time criteria of 50 & 45dB $L_{Aeq,15min}$ respectively and are below the ambient noise levels measured in the vicinity of each location during both daytime and night time periods.

It should also be noted that the above predictions assume a worst case condition of all units running simultaneously and at maximum operating conditions.

No mitigation measures are therefore required in respect of building services plant except provision of the perimeter barrier wall and selection of the low noise mechanical plant (as detailed in Table 8).

5.2.2 Delivery Truck Events

Delivery truck unloading activities will occur at the southern side of the building (as shown in Figure 9 on the following page). At this location, it will be shielded from the nearest residential receptors on all sides: from the future dwellings to the south by the 4m high boundary wall, from the existing dwellings to the west by the earth bund and the apartment and child care buildings to the north / east by the food store building itself. It will also be significantly shielded from potential future developments to the east by the perimeter retaining wall, the retail and substation buildings and the perimeter boundary hedging.

The noise level at a distance of 10m from a typical LIDL delivery service yard is of the order of 64dB $L_{Aeq,1hr}$. This noise level was measured over the course of a full hourly period at a LIDL facility in Cork and includes the effects of reflections from building façades / service yard boundaries and contributions from all sources of delivery event noise, i.e. vehicles manoeuvring, air brakes, reversing alarms, refrigeration units and trolleys. It would therefore be as precise an estimation as possible and typical of noise level emissions from LIDL delivery truck events at any store location.

Regarding delivery event frequency, we understand that there will typically be only one delivery per day and a maximum of two. The duration of each delivery will typically be one hour or less.

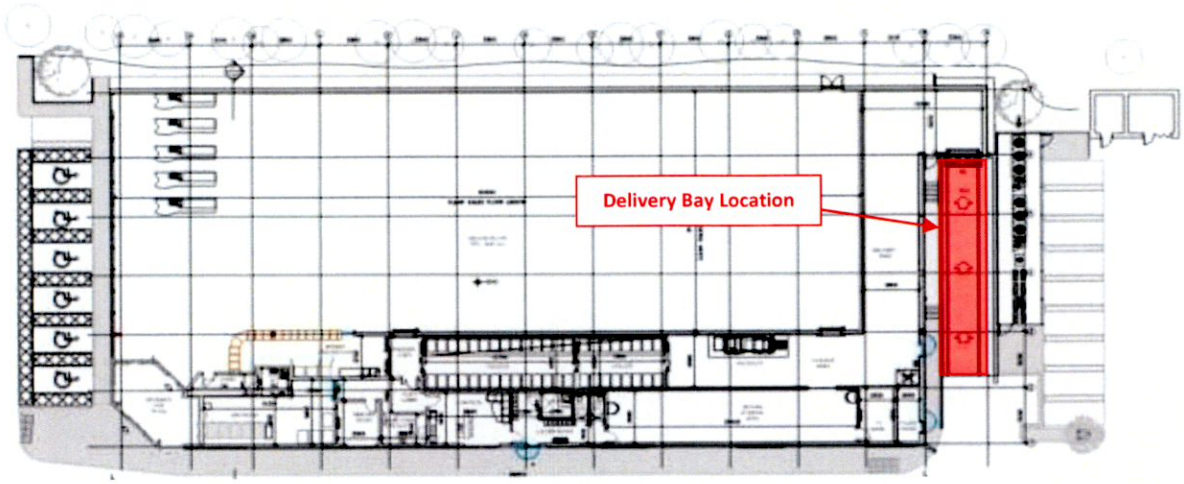

Figure 9 Proposed Development Delivery Bay Location

Taking into account the delivery noise level above along with the appropriate corrections for distance, screening, and the presence of nearby reflecting surfaces, the resultant noise levels at the façades of the nearest noise-sensitive locations would therefore be as follows:

- Apartment Building to the North 25dB L_{Aeq}
- Child Care Building to the East 26dB L_{Aeq}
- Existing Dwellings to the West 45dB L_{Aeq}
- Future Dwellings to the South 43dB L_{Aeq}

The predicted noise levels at the nearest noise sensitive receptors are predicted to be in the range of 13 to 33dB L_{Aeq} which is lower than the daytime criterion of 50dB L_{Aeq}.

It should also be noted that, unlike building services and car parking noise emissions, delivery truck noise emissions will only occur during a small percentage of the time (i.e. 1 - 2 hours per day).

No additional mitigation measures are therefore required in respect of delivery truck events.

5.2.3 Car Parking

Car parking on the proposed development site will be conducted on surface car park areas distributed uniformly across the site. Given that the LIDL store will be closed at 10pm, there isn't expected to be any significant car parking activity during the night-time period. Car parking noise emission is therefore assessed for the daytime period only.

Noise level measurements have previously been carried out in the vicinity of surface car parks in support of similar planning applications. Typical noise levels measured at 10 meters beyond the boundary of these surface car parks during busy daytime periods were of the order of 48dB $L_{Aeq,1hr}$.

Taking into consideration this noise level along with the appropriate corrections for distance, screening, and the presence of nearby reflecting surfaces, the resultant noise levels at the façades of the nearest noise-sensitive locations have been calculated and are predicted to be as follows:

- Apartment Building to the North 30dB L_{Aeq}
- Child Care Building to the East 37dB L_{Aeq}
- Existing Dwellings to the West 30dB L_{Aeq}
- Future Dwellings to the South 29dB L_{Aeq}

The predicted noise levels at the nearest noise sensitive receptors are predicted to be in the range of 29 to 37dB L_{Aeq} which is lower than the daytime criterion of 50dB $L_{Aeq,15min}$ as well as the ambient noise levels in the vicinity of each of the locations during the daytime period.

The predicted noise level at the nearest retail buildings are predicted to be in the range of 38 to 50dB L_{Aeq} which is also lower than both the daytime criterion of 65dB L_{Aeq} and the ambient noise levels measured in the vicinity during the daytime period.

No mitigation measures are therefore required in respect of car parking noise emissions.

5.2.4 Additional Vehicular Traffic on Public Roads

The proposed development will introduce some small levels of additional traffic onto public roads in the locality of the site. The traffic flow information was provided by Stephen Reid Consulting for the opening year 2024 and the design year 2039. The results of our analysis based on this information are presented in Tables 10 & 11 below.

Opening Year 2024	AM Peak Flows		Change in Noise Level (dB)
	Without Development	With Development	
R405 East (Upper Main St)	864	994	**+ 0.6**
R405 West (Upper Main St)	772	880	**+ 0.6**
R120 North (Peamount Rd)	467	526	**+ 0.5**
L6001 South (Agloe Rd)	555	623	**+ 0.5**

Table 10 Change in Traffic Noise Level for the Opening Year 2024

Opening Year 2039	AM Peak Flows		Change in Noise Level (dB)
	Without development	With development	
R405 East (Upper Main St)	996	1053	**+ 0.2**
R405 West (Upper Main St)	890	933	**+ 0.2**
R120 North (Peamount Rd)	538	558	**+ 0.2**
L6001 South (Agloe Rd)	639	661	**+ 0.1**

Table 11 Change in Traffic Noise Level for the Design Year 2039

The differences between predicted traffic flows with and without the site are such that the resulting increase in noise levels will be < 1dB on the surrounding road networks. The impact of this increase is therefore considered to be imperceptible and therefore negligible.

No mitigation measures are therefore required in respect of additional vehicular traffic on public roads.

5.2.5 Cumulative Noise Levels

The total level of combined noise emissions from the proposed development noise sources can be determined by summing together all of the individual contributions. The total levels of each are summarised and totalled in Tables 12 & 13 below.

Noise Source	Noise Level Emission (dB $L_{Aeq,16hr}$)			
	Apt Building to North	Child Care Building to East	Existing Dwellings to West	Future Dwellings to South
Building Services Plant	< 10	10	25	29
Delivery Truck Events	25	26	45	43
Car Parking on Site	30	37	30	29
Additional Vehicular Traffic	Negligible	Negligible	Negligible	Negligible
Cumulative Noise Level	**30 - 31[3]**	**37 - 38[3]**	**32 - 45[3]**	**33 - 43[3]**

Table 12 Proposed Development Cumulative Noise Levels - Daytime Period Summary

Noise Source	Noise Level Emission (dB $L_{Aeq,8hr}$)			
	Apt Building to North	Child Care Building to East	Existing Dwellings to West	Future Dwellings to South
Building Services Plant	< 10	10	25	29
Delivery Truck Events	Not Applicable			
Car Parking on Site	Not Applicable			
Additional Vehicular Traffic	Negligible	Negligible	Negligible	Negligible
Cumulative Noise Level	**< 10**	**10**	**25**	**29**

Table 13 Proposed Development Cumulative Noise Levels - Night Time Period Summary

These cumulative noise levels are compared with the established project noise emission criteria in Tables 14 & 15 on the following page.

[3] Given that delivery truck events will only occur 1 - 2 hrs per day, calculations were conducted with and without delivery event contributions in order to determine both standard worst case and extreme worst case conditions, hence the listed noise level range.

Location	Predicted Noise Level Range	Noise Emission Criteria	Compliant?
Apt Building to North	30 - 31 dB $L_{Aeq,16hr}$	**50dB $L_{Aeq,16hr}$**	Yes
Child Care Building to East	37 - 38 dB $L_{Aeq,16hr}$		Yes
Existing Dwellings to West	32 - 45 dB $L_{Aeq,16hr}$		Yes
Future Dwellings to South	33 - 43 dB $L_{Aeq,16hr}$		Yes

Table 14 Proposed Development Daytime Noise Emission Level Comparison with Criteria

Location	Predicted Noise Level Range	Noise Emission Criteria	Compliant?
Apt Building to North	< 10 dB $L_{Aeq,8hr}$	**45dB $L_{Aeq,8hr}$**	Yes
Child Care Building to East	10 dB $L_{Aeq,8hr}$		Yes
Existing Dwellings to West	25 dB $L_{Aeq,8hr}$		Yes
Future Dwellings to South	29 dB $L_{Aeq,8hr}$		Yes

Table 15 Proposed Development Night Time Noise Emission Level Comparison with Criteria

As can be seen in the tables above, the expected levels of noise emissions from the proposed development are within the established criteria at all adjacent noise sensitive receptors during both daytime and night time periods.

It should also be highlighted that the noise level conditions that were assessed would be considered worst case in each instance. Furthermore, most of the predicted levels would also be consistent with or below the ambient noise levels measured at the nearest residential receptors during both daytime and night time periods. Noise emissions during delivery events are predicted to be slightly above the ambient noise level at the nearest existing / future dwellings to the west and south but are still comfortably below the established criteria and will only occur for a small portion of a given day. Noise emissions from the proposed development to areas to the east should also be sufficiently shielded by the perimeter retaining wall, the retail and substation buildings and the perimeter boundary hedging.

There are therefore no significant noise impacts that are expected from the proposed development on any of the identified adjacent noise sensitive receptors during any time period.

6.0 AVOIDANCE, REMEDIAL & REDUCTIVE MEASURES

Whilst all the noise emission predictions detailed in the previous sections fall within the adopted criteria, the following best practice measures are still recommended for the proposed development to minimise the potential for disturbance due to noise.

6.1 Construction Phase

Although there are not predicted to be any significant noise impacts in respect of construction activity noise emissions, best practice noise control measures should still be employed. In this instance, reference is made to *BS5228: Noise control on construction and open sites*. This document provides detailed guidance on the control of noise from demolition and construction activities.

In particular, it is proposed that various practices be adopted during construction including:

- ✓ Ensure noise generated during the construction phase is in line with the National Roads Authority document on construction noise.
- ✓ Establishing channels of communication between the contractor/developer, Local Authority and residents as detailed in the Construction Management Plan.
- ✓ Appoint a site representative responsible for matters relating to noise.
- ✓ Monitoring typical levels of noise during critical periods in the vicinity of dwellings along the northern boundary.

Furthermore, it is envisaged that a variety of practicable noise control measures will be employed. These should include the following:

- ✓ Construction phase activities will occur during daytime periods only.
- ✓ Selection of plant with low inherent potential for generation of noise.
- ✓ Erection of barriers as necessary around items such as generators or high duty compressors.
- ✓ Placement of noisy plant as far away from sensitive properties as permitted by site constraints.

It is also highly recommended that scheduling of the Demolition phase is coordinated with Kelly's Estates in order to minimise potential noise and vibration impacts from demolition of their building extensions.

6.2 Operational Phase

6.2.1 Building Services Plant

The predicted noise levels from building services plant are within the adopted criteria for both the daytime and night-time periods. The only mitigation considerations that would be deemed as being required are:

- ✓ Selection of low noise external plant at the levels detailed in Table 8.
- ✓ Provision of the 2m high boundary wall around the perimeter of the external plant area.

In addition, the following 'good practice' measures should also be considered in respect of this external plant:

- ✓ All mechanical plant items e.g. motors, pumps, etc. shall be regularly maintained to ensure that excessive noise generated by worn / rattling components is minimised.
- ✓ Any new or replacement mechanical plant items shall be designed so that all noise emissions from site do not exceed the noise limits outlined in this document.

6.2.2 Delivery Truck Events

The predicted noise levels are within the adopted daytime criteria at all noise sensitive locations and there will only be one or two deliveries each day.

Notwithstanding that the delivery noise levels are within the criteria, the following 'good practice' issues would still be advised for the site:

- ✓ Vehicle engines should not be left idling once on site. In addition, on-board refrigeration units (if any) shall also be turned off when on site.
- ✓ Drivers should minimise impact sounds whilst working about their vehicle. This includes dropping tailgates and moving cages and pallets.
- ✓ All radios and amplified music in the truck cab shall be turned off prior to the doors being opened.
- ✓ No shouting or communicating in raised voices whilst on site.
- ✓ No unnecessary sounding of horns whilst on site.

In addition to the above truck noise management practices, we would propose that the following practices should be adopted to minimise potential noise disturbance for neighbours:

- ✓ Appoint a Noise Liaison Officer shall ensure that all truck drivers have been briefed and understand the requirements of the site. It will be the Noise Liaison Officer's responsibility to ensure that drivers are adhering to the requirements of site practice.
- ✓ Staff should not communicate in raised voices within the delivery area.
- ✓ Appropriate signs should be erected requesting that staff should keep noise to a minimum within the service yard and docking area.
- ✓ Roll cages should be fitted with composite rubber and nylon wheels that reduce shock loads and consequent vibration and noise.
- ✓ Metal cages should be replaced with much quieter plastic dollies where practicable.
- ✓ The surface of the service yard should be smooth and continuous with no holes or ridges that would cause trolleys to vibrate unnecessarily.

6.2.3 Car Parking

The noise impact assessment has demonstrated that ameliorative measures are not required in respect of car parking noise.

6.2.4 Additional Vehicular Traffic on Public Roads

The noise impact assessment has demonstrated that ameliorative measures are not required in respect of additional vehicular traffic on public roads.

7.0 SUMMARY OF RESULTANT NOISE IMPACT

This section summarises the likely residual noise impact associated with the proposed development, taking into account the ameliorative measures described in Section 5.0.

7.1 Construction Phase

During the construction phase of the project, there will always be a potential impact on nearby residential properties due to noise emissions from site traffic and other activities. However, in this instance, noise emissions are expected to be within appropriate limits.

Given the above results, it is expected that construction noise emissions will not be excessively intrusive and implementation of appropriate best practice noise control measures, will further ensure that noise impact is kept to a minimum and within appropriate levels.

7.2 Operational Phase

7.2.1 Building Services Plant

The predicted noise levels associated with building services is within the criteria of 50dB $L_{Aeq,16hr}$ daytime and 45dB $L_{Aeq,8hr}$ night-time at all adjacent noise sensitive locations.

7.2.2 Delivery Truck Events

The predicted noise levels associated with delivery truck events is within the daytime criterion of 50dB $L_{Aeq,16hr}$ at all adjacent noise sensitive locations.

7.2.3 Car Parking

The predicted noise level associated with car parking events is within the daytime criterion of 50dB $L_{Aeq,16hr}$ at all adjacent noise sensitive locations.

7.2.4 Additional Vehicular Traffic on Public Roads

The increase in noise as a result of the proposed development's additional traffic on public roads associated will not be perceptible.

APPENDIX A

SOUND LEVEL METER CALIBRATION CERTIFICATE

NSAI
National Metrology Laboratory

Certificate of Calibration

Issued to	CLV Consulting The NSC Campus Mahon Co. Cork
Attention of	Niall Vaughan

Certificate Number	213041
Item Calibrated	NTi Audio XL2-TA Sound Level Meter with NTi Audio MC230A Microphone
Serial Number	A2A-11070-E0 (SLM) and A14422 (Microphone)
ID Number	None
Order Number	210702
Date Received	26 Jul 2021
NML Procedure Number	AP-NM-09
Method	The above sound level meter was allowed to stabilise for a suitable period in laboratory conditions. It was then calibrated by carrying out the verification tests detailed in IEC 61672-3 (2006), *Periodic tests, specification for the verification of sound level meters*. This standard specifies a procedure for the periodic verification of conformance of a sound level meter or integrating-averaging meter to IEC 61672-1 (2003).
Calibration Standards	Norsonic 1504A Calibration System incorporating: SR DS360 Signal Generator, No. 0735 [Cal Due Date: 31 Dec 2019] Agilent 34401A Digital Multimeter, No. 0736 [Cal Due Date: 31 Dec 2019] B&K 4134 Measuring Microphone, No. 0743 [Cal Due Date: 24 Apr 2021] B&K 4228 Pistonphone, No. 0741 [Cal Due Date: 19 Jan 2020] B&K 4226 Acoustical Calibrator, No. 0150 [Cal Due Date: 21 Jun 2020]

Calibrated by	David Fleming	**Approved by**	Paul Hetherington
Date of Calibration	10 Aug 2021	**Date of Issue**	11 Aug 2021

CIPM MRA

This certificate is consistent with Calibration and Measurement Capabilities (CMC's) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures. Under the MRA, all participating institutes recognize the validity of each other's calibration certificates and measurement reports for quantities, ranges and measurement uncertainties specified in Appendix C (for details see www.bipm.org)

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Glasnevin | Dublin 11 | Ireland T+ 353 1 808 2609 | F+353 1 808 2603 | NSAI.ie

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APPENDIX B

CALIBRATOR CALIBRATION CERTIFICATE

Manufacturer Calibration Certificate

The following instrument has been tested and calibrated to the manufacturer specifications.
The calibration is traceable in accordance with ISO/IEC 17025 covering all instrument functions.

- Device Type: **Class 1 Sound Calibrator CAL200**
- Serial Number: **18882**

- Date of Calibration: **09 September 2021**
- Certificate Number: **44448-18882-CAL200**
- Results: **PASSED**
  (for detailed report see next page)

Tested by: D.Young

Signature: 

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email: uk@nti-audio.com Web: www.nti-audio.com. VAT Number 314751712

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