

**7 Darney Road
Air Mitigation Report**

For

Se&Se Consultancy Ltd

Job No: A438
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Kench Consultants Ltd 7 Sherwood House, Walderslade Centre Walderslade Road Chatham Kent ME5
9UD

T: 0208 057 6552

E: info@kenchconsultants.com W: www.kenchconsultants.com



Low
Carbon Energy
Assessor

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Appendix 1 – MVHR Model and Datasheet

1. INTRODUCTION

This report is a commissioned Air Quality Mitigation Report on a scheme at 7 Darnley Road Gravesend Kent DA11 0RU.

The development (app ref: 20150923) is for the 'Change of use of the basement and ground floor from offices to a restaurant (Use Class A3) incorporating the erection of a single storey rear extension with terrace over, enlargement of the basement and conversion of the first floor and loft space into 1no. self-contained maisonette with access via 4-6 Darnley Road.'

This Report seeks to satisfy Planning Condition 6 which states:

"Prior to the commencement of the development hereby permitted a detailed scheme for air quality mitigation, shall be submitted to and approved, in writing, by the Local Planning Authority. The scheme must include a positive pressure air system, heat recovery, sealed windows on the front elevation and fresh intake air coming from a suitable clean source at the rear of the building and sited so that it would not be contaminated by odour from the extraction system for the restaurant use at the ground and basement levels of the building or any other pollution source e.g. gas flue etc.

The approved scheme shall be installed to the satisfaction of the Local Planning Authority prior to the first occupation of the maisonette hereby permitted. Thereafter, also prior to first occupation, the Local Planning Authority shall be provided with a written commissioning report from a competent ventilation engineer that the approved system has been incorporated into the maisonette and that it fulfils its purpose (i.e. that it prevents pollution from the roadside entering the maisonette) and shall

also be inspected by the Local Planning Authority to ascertain that the system in place is in suitable working order. The system shall be maintained as approved and in full working order at all times.

Reason: *In order to protect the amenity of future occupants of the maisonette at first and second floor level as the majority of the site is within a declared Air Quality Management Area (AQMA) for Nitrogen dioxide and the site itself suffers from high levels of Nitrogen dioxide from road traffic."*

This report has also been written to satisfy the Air Quality checklist associated with the development. This checklist can be seen on the following page

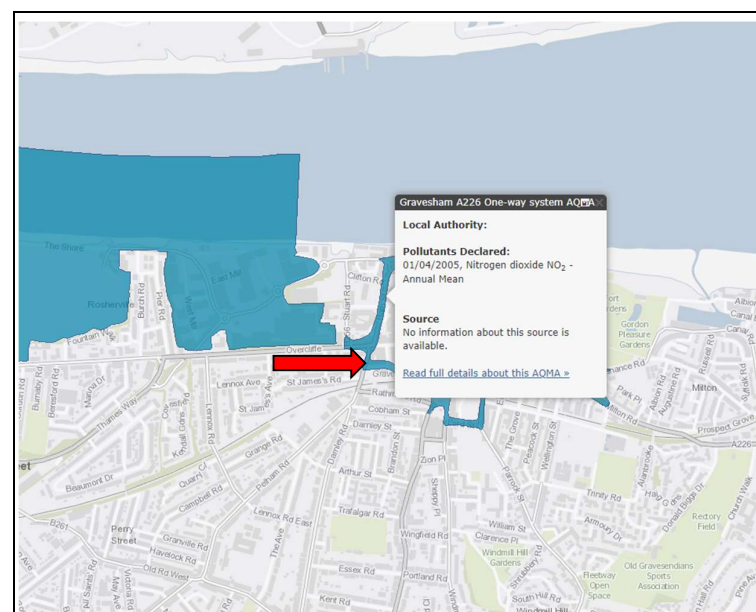


Figure 1: AQMA Local Boundary with Site Location

	Checklist	Section / Comment
1	Written confirmation that air system to be installed	Section 4 – Proposed Installer – p10
2	Confirmation that system to be installed prior to occupation	Section 4 – Proposed Installer – p10
3	Full details of supplier	Section 4 – Proposed Manufacturer – p10
4	Full details of installer	Section 4 – Proposed Installer – p10
5	Details of unit including make, model number etc. in each apartment	Section 4 – Proposed MVHR Unit and Schematic – p9
6	Confirmation that unit has a heat exchange system	Section 4 – Proposed Manufacturer – p10
7	Written details of locations of units and ductwork	Section 4 – Proposed MVHR Unit and Schematic – p9 Section 4 - Kitchen Flue and MVHR Inlet Location – p12
8	Written details of locations of inlets and outlets (must be outside of polluted area i.e. rear roof level at the furthest point away from traffic away from flues etc.)	Section 4 - Kitchen Flue and MVHR Inlet Location – p12
9	Layout and elevation plans submitted including ducting, inlets and vents etc. Plan numbers.	Section 4 - Kitchen Flue and MVHR Inlet Location – p12
10	Details of the acoustic attenuation of the air system to prevent noise breakout causing nuisance to occupiers in the apartment and neighbours.	Section 4 – Noise Attenuation – p10
11	Confirmation of the absence of trickle or other passive vents.	Section 4 – Ductwork – p10
12	Confirmation windows and balcony doors permanently sealed closed	Section 3 – p8

13	Confirmation that system will be running 24 hours and cannot be turned off	Section 4 – Control of Electricity Supply – p11
14	Details of settings for flow rate for inlet air (note this must be higher than outlet rate to create positive pressure)	Section 4 – Flow Rate (Inlet Air) – p10
15	Details of settings for flow rate for extract air	Section 4 – Flow Rate (Extract Air) & Boost Settings – p10
16	Details of boost settings for when cooking smells or steam present	Section 4 – Flow Rate (Extract Air) & Boost Settings – p10
17	Air temp setting degrees C	Section 4 – Flow Rate (Extract Air) & Boost Settings – p10
18	Control of electricity supply to unit (advised that fused spur to be in a location not easily accessible to resident but accessible by service engineer)	Section 4 – Control of Electricity Supply – p11
19	Confirmation that occupant cannot turn off system (note resident/tenant must not be able to disable the system easily)	Section 4 – Control of Electricity Supply – p11
20	Details of maintenance regime including filter cleans and servicing, who by and what periods.	Section 4 – Maintenance Regime – p11
21	System compliant with Building Regulations?	Section 4 – Proposed Manufacturer – p10
22	Has the risk of solar gain affecting internal room temperatures been addressed?	Section 3 – p8
22	Details of information to be supplied to the future occupier about the system and the reasons why it has been installed etc. i.e. copies of operating manuals and details of schedule of maintenance and who is responsible.	Section 4 – Commissioning – p11
23	Independent ventilation engineer to carry out commissioning inspection of systems to confirm that inlet and outlet settings are correct and to confirm that system fulfils its purpose i.e. to create positive pressure within residential unit to ensure no polluted air comes in from outside etc. Report to be produced and submitted to LPA.	Section 4 – Commissioning – p11
24	Visit to site by LPA to see system installed and working.	Section 4 – Commissioning – p11

2. BACKGROUND – MITIGATION MEASURES

Mechanical Ventilation with Heat Recovery

MVHR (Mechanical Ventilation with Heat Recovery) provides fresh filtered air into a building whilst retaining most of the energy that has already been used in heating the building.

Heat Recovery Ventilation is the solution to the ventilation needs of energy efficient buildings. Mechanical ventilation with heat recovery (MVHR), heat recovery ventilation (HRV) or Comfort ventilation are all names for the same thing.

A heat recovery ventilation system properly fitted into a dwelling provides a constant supply of fresh filtered air, maintaining the air quality whilst being practically imperceptible.

MVHR works quite simply by extracting the air from the polluted sources e.g. kitchen, bathroom, toilets and utility rooms and supplying air to the 'living' rooms e.g. bedrooms, living rooms, studies etc. The extracted air is taken through a central heat exchanger and the heat recovered into the supply air. This works both ways, if the air temperature inside the building is colder than the outside air temperature then the coolth is maintained in the building.

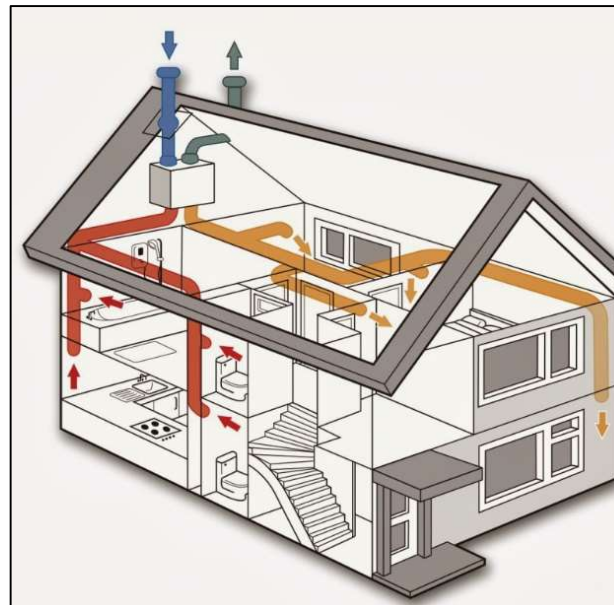


Figure 2: MVHR system illustration

Positive Pressure Air (Ventilation) System (PPAS)

Positive Pressure Ventilation Systems draw in fresh air and dry it at an ambient temperature. The air is then gently and continuously introduced into the property via a fan, whereby it can displace and dilute the stale, moist air that is present in the house.

The most common type of Positive Pressure Ventilation System consists of a loft unit fitted into the roof void, ducted via an air diffuser, and mounted above a ceiling vent in the ceiling above a stairwell. Some systems are supplied with a pre-heat facility which heats the air before it is pushed down into the property, and controls for both heating and fan speed are usually located on the wall in the landing area.

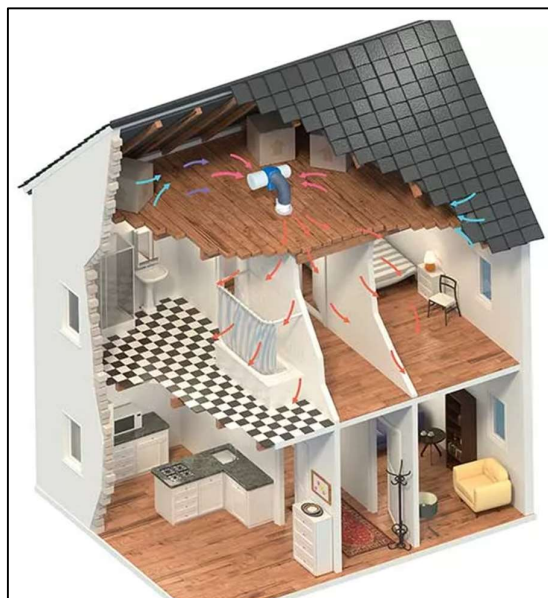


Figure 3: PPAS illustration – Source: Nuaire

Positive Pressure Air System and MVHR Distinctions

A PPAS unit works much in the same way as a Mechanical Ventilation with Heat Recovery (MVHR) system. MVHR however, requires ducting which isn't always feasible to add to an existing house. PPAS does not possess the ability to recover heat from escaping high-pressure hot air that is forced out of the dwelling via the process of positive air pressure.

PPAS consists of a single unit typically fitted in a loft, making it a good retrofit option. It is, however, much more accustomed to older dwellings and is not seen in many modern buildings. MVHR can also be designed to create a system and regime of positive pressure similar to that of a standalone PPAS.

If airtightness cannot be guaranteed or the duct runs cannot be designed and installed with low resistance (which can be a challenge in existing homes) then PPAS can be considered over MVHR.

A large drawback from PPAS is that it will increase heating costs if not mitigated against. The effects of PPAS adds cool air from the outside and circulates it around a dwelling. As such, heating systems have to work harder in colder months.

Based on these comparisons, if MVHR can be fitted to a dwelling, then it provides benefits that PPAS do not, and does not possess the drawbacks that PPAS exhibits.

3. OVERHEATING AND SOLAR GAINS

Criterion 3 of Part L 2013 of the Building Regulations relates to limiting the effects of heat gains in summer - this is implemented for new dwellings as set out in Appendix P of SAP 2012. All dwellings pass this Criterion.

The overheating & cooling hierarchy as seen on the right-hand side of this section, addressed the risk of solar gain affecting internal room temperatures.

The Building Regulations recognises that Criterion 3 does not cover all factors influencing overheating and that there is no guarantee that buildings will not overheat.

However, this development should have no issues with overheating due to all stages of the cooling hierarchy being followed, with the lack of communal heat distribution, provision of MVHR and windows with blinds being major factors in mitigating any potential risks.

Stage 4 of the Cooling Hierarchy will not be strictly adhered to as windows on the front elevation will be sealed. Windows on the rear elevation will be openable.

The site visit conducted on the 1st February 2022 confirmed that the windows are sealed at the front elevation.

Cooling Hierarchy	Measures Undertaken
1. Minimising internal heat generation through energy efficient design	As the dwellings will be heated by Individual Boilers, there will be no communal heat infrastructure in the building requiring mitigation.
2. Reducing the amount of heat entering the building in summer	- Carefully designed shading measures have been considered, including: - specification of Internal Blinds - designing in the stack-effect
3. Use of thermal mass and high ceilings to manage the heat within the building	- Level of exposed thermal mass has been maximised where possible, but it must be noted that in high buildings the internal partitions are built to minimize its weight so increasing thermal mass of internal partitions is not feasible for this scheme - The Floor to Ceiling Height complies with statutory requirements.
4. Passive Ventilation	Openable Windows
5. Mechanical ventilation	MVHR will be installed. Mechanical Ventilation will make use of 'free cooling' (when the outside air temperature is below that in the building during summer months). This will be achieved via a by-pass mode on the heat recovery system for summer mode operation.

Table 1: Cooling Hierarchy

4. PROPOSED MITIGATION MEASURES (MVHR DETAILS)

For the scheme at Darnley Road and based on the background considerations listed in Section 2, it is therefore considered appropriate to utilise an MVHR system. The following is demonstrated in this section:

- MVHR can be fitted to the existing property;
- The MVHR intake will be positioned away from the ground floor restaurant flue, with wind direction considered;
- The windows will be sealed to provide further protection from pollutants and odours.

Existing Heating Arrangements

A site visit was conducted on the 1st of February 2022. This site visit confirmed that the existing heating is provided by a Low Temperature Hot Water system.

A low-temperature heating system is defined as one in which the hot water leaving the heat generator is always at a temperature not exceeding 45 °C or 35 °C.

Low-temperature heating possesses a different system design, mainly to ensure that the heat emitters (radiators, fan-assisted radiators or convectors, or underfloor heating pipes) can deliver the same amount of heat at the lower temperature as a traditional radiator system would have done at normal temperature (over 55 °C). The emitters in each room must be sized correctly to ensure they can achieve that. The existing property at Darnley Road has been fitted radiators to achieve this.

Proposed MVHR Unit and Schematic

The below schematic and proposals can and have demonstrated that an MVHR system with ducting will be applicable to the property at Darnley Road. This schematic has been designed with the proposed (found in Appendix 1) HRV1.25 Q Plus Range. There will be one unit to serve the individual and single dwelling.

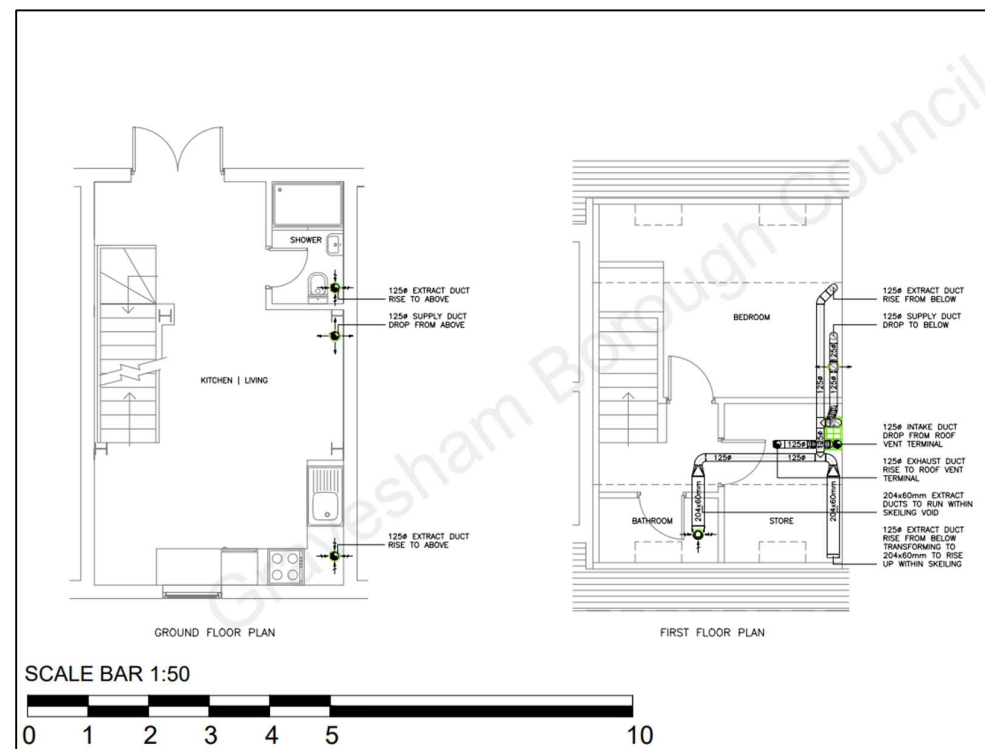


Figure 4 : Proposed MVHR System

Proposed Manufacturer

The proposed manufacturer as mentioned above will be Titon. Specifically, the Titon HRV1.25 Q Plus Range model will be utilised at the development.

The Titon HRV1.25 Q Plus Range model will also be installed with a heat exchange system. Additionally, the Titon HRV1.25 Q Plus Range model is compliant with building regulations.

Proposed Installer

The installation of the proposed Titon MVHR system will be done by a certified professional and/or company and will take place prior to occupancy of the new property.

Ductwork

As previously mentioned, the new property will be designed with ducting and will therefore be suitable for an MVHR system. This ducting will be rigid plastic, with dimensions of 204 x 60mm or 125mm diameter (minimum) complete with thermal ducting on the atmosphere side of the ductwork.

Further to this, the system will not possess any trickle vents or passive vents.

Noise Attenuation

To prevent noise breakout causing nuisance to occupiers in the apartment – and neighbours, attenuators will be installed to the Titon system. These

will specifically be the Titon Semi Flexible Attenuators 89720 125mm diameter X 500mm.

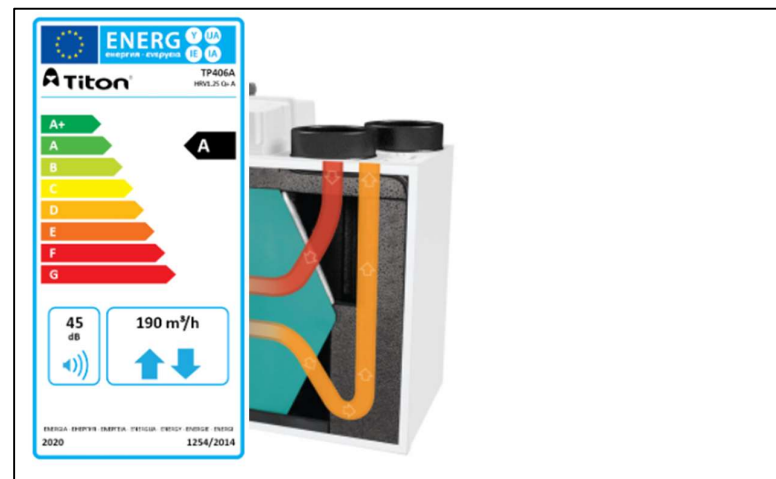


Figure 5 : Proposed MVHR Model and Rating

Flow Rate (Inlet Air)

Controlled ventilation and flow rate can be achieved with the Titon model and MVHR in general. This will be balanced, or create positive pressure, via two separate fan speed settings that can be manually or via on Aura-T controller that can programme percentage speed settings.

Flow Rate (Extract Air) & Boost Settings

Part F Buildings regulations provides minimum low and high rates for MVHR systems. A Boost switch can be fitted to each individual Kitchen and Wet Room that will switch between low continuous rate and boost high rate.

The Titon MVHR unit will also have a programmed RH (Relative Humidity) percentage rate set between 65 and 90% RH which can trigger the

ventilation setting to Boost automatically.

Control of Electricity Supply

The Titon MVHR unit will be installed with a fused spur which is a switch that's used to isolate electrical equipment from the mains supply. As such, the control of electricity supply will be available.

This fused spur will be installed at a high level next to the MVHR and as such would not be easily accessible to any new resident/occupier but would be accessible for a service engineer. Because of this, the occupant will not be able to disable the system easily.

Further to this, the system will also be running for 24 hours each day and will not turn off.

Maintenance Regime

A filter cleaning indication will be programmed for inspection via an Aura-T controller. The Aura-T is a simple touchscreen controller for programming, commissioning and occupancy control for Titon's range of Mechanical Ventilation Heat Recovery (MVHR) units. This will therefore be able to be used by the new occupier to clean their own filtration unit.

Further guidance will also be provided to any new resident in the form of a leaflet or provision of online guidance, to facilitate the cleaning of the MVHR filter.

The Aura-T touch screen controller also allows straightforward operation of ventilation speeds. Offering a display that is backlit, and provides enhanced functionality when connected to a 2019 HMB model. This filtration will be reviewed every 6-12 months depending on environmental

conditions, and programme timing can be altered between 0-24 months.

Commissioning

An independent ventilation engineer is to carry out the commissioning inspection of the MVHR system to be installed, and to confirm that the inlet and outlet settings are correct. The engineer will also confirm that the system fulfils its purpose of creating positive pressure with heat recovery.

This is to ensure that no polluted air from the outside comes inside the new dwelling. Once this engineer has completed his inspection, he is to carry out a report and submit it to the LPA independently. Following this, the LPA will also undertake a site visit to ensure that the system is installed and working.

Both of these commissioning arrangements are to be made by the contractor once the installation is complete.

A leaflet will be provided to the future occupant by the developer, that at a minimum will include for:

- The reasoning for the installation of the MVHR
- Operating manuals
- Details of schedule of maintenance and who is responsible
- Aura-T Controller details
- Relative online details for all of the above.

Kitchen Flue and MVHR Inlet Location

The site visit conducted on the 1st February confirmed the locations of the extract ventilation system (flue) present at the roof level of the ground floor restraint. The precise location of this flue relative to the site layout can be seen across.

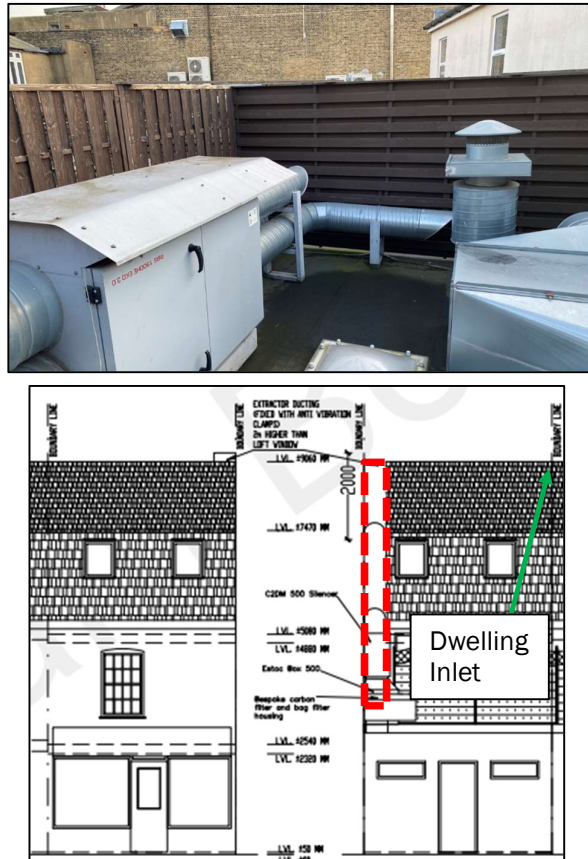


Figure 6 : Kitchen Flue & Extract Rooftop Locations

The positioning of the inlet for the MVHR ducting system is imperative in ensuring comfort at the dwelling above the restaurant premises.

The inlet/intake position demonstrated on Figure 4 is deemed to be in a suitable position away from the extract restaurant flue, and to the farthest distance from traffic that is possible.

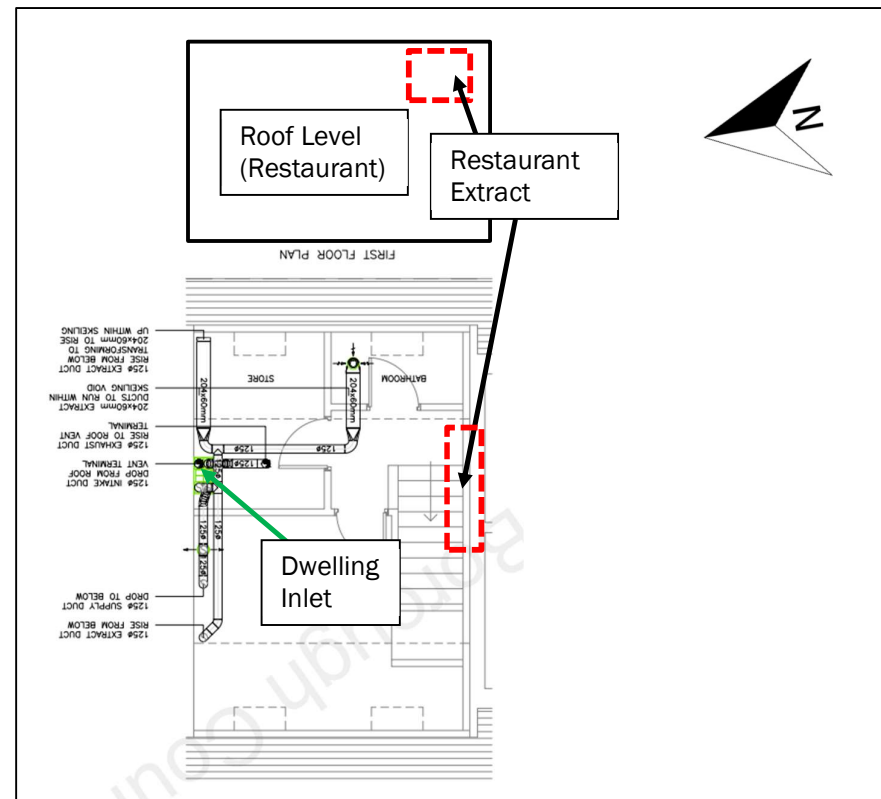


Figure 7 : Flue and Inlet Relative