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Perit Eric Formosa

2nd November 2017

C.c. Tonio Montebello

Wasteserv Malta

EkoCentre, Latmija Rd.,

Marsascale MSK4613

PA TN 197179

C.c. The Chairman - PA

Dear Sirs,

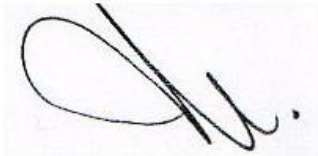
**FIRE SAFETY, VENTILATION, LIGHT & NOISE EMISSIONS / MITIGATION MEASURES
REPORTS - for Proposed Construction of Chemical Room over existing Garage**

Please find hereunder REPORT/S requested by PA for the above project. This report is based on a set of architectural drawings forwarded by Wasteserv Architect Eric Formosa, endorsed copy with comments is attached.

In line with PA screening letter, We confirm that by implementing the requirements listed in this report, including: (i) fire detection and fire-fighting measures, (ii) means of ventilation in conformity to relevant DC2015 clauses, and smoke extraction as indicated; (iii) noise emissions mitigation measures, (iv) mechanical ventilation providing sufficient air changes where natural ventilation is lacking, and Natural / Artificial Lighting complying to Sanitary law LN227 of 2016; then the premises will meet the required local and international standard.

The measures listed within this report must be implemented fully for a final Compliance certificate to be issued by the undersigned, once the project is completed. Therefore, We suggest that Architectural designers and M&E Engineers are copied with this report and drawings, so that they can include the necessary requirements in the instructions to contractors. Also note that Suppliers and Contractors MUST certify their works. Whilst this

is standard for M&E systems, one needs to clarify this point to the finishes contractors, particularly where Structural fire rating, fire compartmentation, partitions, soffits and fire doors are concerned. Should anything be unclear, kindly contact the undersigned for further explanations.



**FIRE SAFETY & DETECTION, MEANS OF VENTILATION, LIGHTING, MITIGATION
MEASURES AGAINST NOISE EMISSIONS NUISANCE REPORTS - WASTESERV SANT
ANTNIN – CHEMICAL ROOM OVER EXISTING GARAGE**

1. PRELIMINARY

This report may require modifications following **review and approval** by the PA, CPD, SEO, ERA & CRPD. We would welcome a meeting where we can clarify and discuss matters, particularly where we refer to mitigation measures or trade-offs. Should the Architect be required to carry out modifications to the plans of the above premises then we would request to be copied in order to verify that the variations do not impact negatively on the fire safety of the building.

As per PA requirements, once the project is completed, and testing, commissioning and handing over has been made, a **COMPLIANCE** certificate needs to be issued by the undersigned Fire Consultant, following a thorough inspection, where verification of the implementation of all prescribed systems has been carried out.

In order to ensure that all works are carried out in full compliance, it is recommended that periodic works inspections and site meetings are held. Any issues that require clarification must be referred to the undersigned.

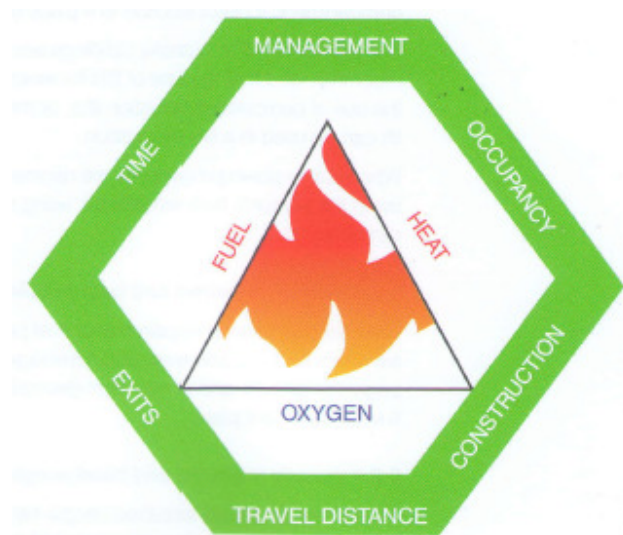
The reports do not relate to any granting of operational licenses. The Risk assessment has been carried out in relation to the plans submitted, and to the available information, provided by Architect and developer/operator. The measures listed in the reports therefore apply only to the scope of the building as mentioned herein.

Should the building use change, the operator MUST inform PA and the undersigned, since the safety measures may need to change. The Undersigned takes no responsibility for undisclosed information from the developer. Therefore the information about: *occupants* (quantity and category), *materials* and *processes* must be stated clearly.

Although the premises as designed would be compliant to the minimum safety requirements, the operator/employer is obliged by law to carry out staff training, appoint H&S/safety/security personnel, and fire wardens particularly since the premises are part of the larger grounds of the Sant Antnin Wasteserv treatment Plant. A Fire plan, policies, procedures, log books, fire drills, etc., must be in place. The Fire Alarm System programming (Cause & Effect matrix)** and all relevant interlocks with other building services MUST be set out and implemented professionally. The Evacuation plan should be studied carefully and drawn up such that the Occupants, Insurance and the CPD are in agreement.

**The Fire detection and Alarm for this building should be linked to the main security/control room.

The MOCTET HEXAGON diagram below depicts the constituent parts of the Protective Measures required by legislation:



6

Ref: The FPA – Fire Risk Assessment Guidance Notes

There are many guidance documents, codes, and standards which may be referred to, however, they are not to be used as prescriptive solutions which MUST be adhered to at

all costs. These are benchmarks to assist the fire risk assessor, which should be referred to in particular where legal notices might not be fully implemented.

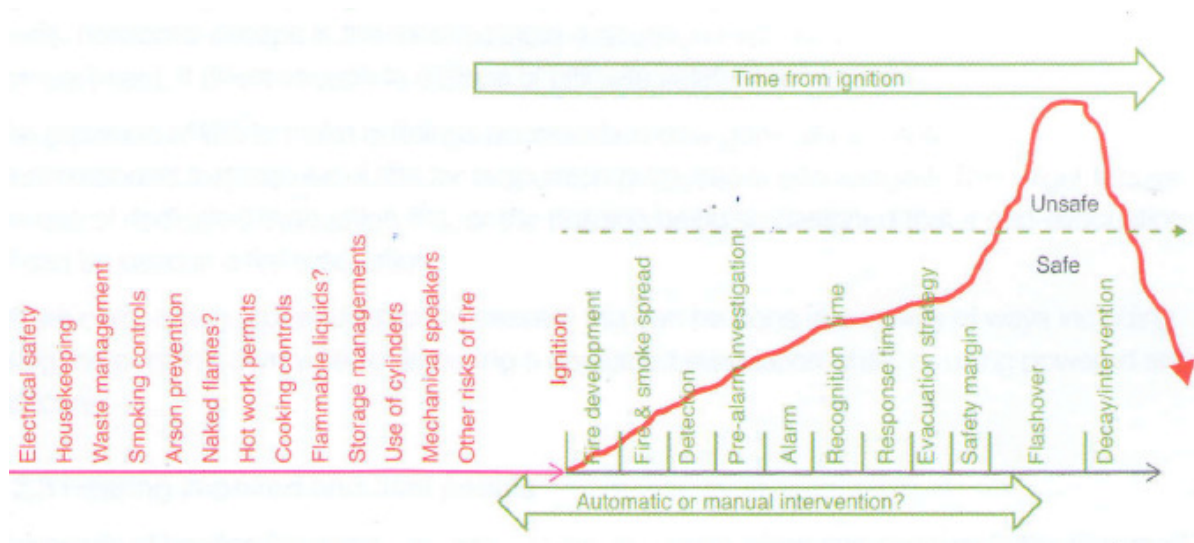
The Fire Safety Report deals with all the elements (sides of the MOCTET Hexagon), however, the following notes relate to Management, an area of building safety often neglected:

The Operator is required by OHSa Law and eventually the Fire Safety ACT (*currently being drafted by the BRO in conjunction with the CPD*) to carry out Fire Risk assessment for the premises.

There are numerous fire safety management issues that must be introduced within the building's operational procedures:

- Fire Safety Policy & procedures
- Training
- Appointing responsible person/duty holder
- Appointing a competent person (risk assessor)
- Procedures for calling the emergency services
- Using fire extinguishers, and fire-fighting systems within premises
- Shut down procedures
- Evacuation strategy
- Emergency evacuation plan, signage
- Fire wardens, security
- Persons/employees needing assistance
- Assembly points
- Fire drills
- In-house inspections, ensuring emergency exits & routes are unobstructed, fire hazards reduced, etc.

One of the most important aspects of fire safety is understanding the fire time-line diagram:



The **Prevention** (red left hand side) stage is all about the building's 'passive' built-in measures (mentioned in the report later paragraphs) and proper management. If a fire starts somewhere in the building (ignition) then the **Protective** measures (green right hand side) come into effect, but are time-related. Proper fire safety preventive and protective measures in place, together with management (emergency preparedness) will help avoid reaching the 'unsafe' stage.

2. SCOPE

The development proposed shall be dedicated to the storage of chemicals. Wasteserv have submitted MSDS of chemicals and a meeting was held on 18/09/2017 to discuss the quantities and storage segregation strategy.

This report should be read in conjunction with any attached documents.

This report does not include aspects related to intruder/access control/security, storm-flooding, and any danger not directly related to Fire.

The scope of this report is to provide guidelines for both the Client and his M&E Consultants on the requirements for Fire Safety as required by PA, SEO (and CPD) in the screening letter. The advice (or parts thereof) given in this report should be included in the structural, MEP and finishes works in order to raise the level of fire protection, increase the safety of occupiers, personnel & public, and preventing material loss (both buildings and contents).

We recommend CCTV coverage in all areas (inside and outside) and fail-safe electronic locks linked to the FAP system wherever these apply. No door shall remain locked during an evacuation.

The undersigned attended meetings with the Client & Architect, in order to clarify some issues.

The criteria used in this report aim:

- To provide adequate protection to the personnel and public occupants and to provide means to fight a fire.
- To diminish the likelihood of fire occurring, and if it does, to limit the size of a possible fire and therefore its consequential damage.
- To improve the level of fire protection so as to limit economic losses in case of fire.
- To prevent spreading of fire from one area to another by introducing fire rated compartments.
- To prevent the effects of heat or toxic fumes causing more serious consequences.

3. REFERENCES

We referred to **BS9999:2008** in order to establish the risk profile for the development; although the project may consist of different categories of risk, it must be noted that the main concern regarding Fire is the achievement of effective evacuation of people, and safe entry into the buildings for the CPD. The main focus has been Life Safety, however Property protection and material loss prevention has also been taken into consideration.

STANDARDS & CODES REFERENCES USED IN THE COMPILATION OF THIS REPORT
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- **Design Guidelines for fire safety in buildings in Malta – BCID**
- **BS 9999:2008** Code of Practice for fire safety in the design, management and use of buildings
- **The FPA- Fire Risk Assessment Course Handbook – 2017**
- **Doc B : FIRE SAFETY**, Building Regulations UK : 2013
- **BS5306-1 or MSA EN 671** Code of practice for fire extinguishing installations and equipment on premises.

- **MSA EN 12845** Fixed fire-fighting systems. Automatic sprinkler systems. Design, installation and maintenance
- **BS5306-3 & 8** Fire extinguishing installations and equipment on premises Selection and positioning of portable fire extinguishers
- **BS5839-1** Fire detection and fire alarm systems for buildings Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises
- **BS EN 1838 & BS5266** Emergency lighting Code of practice for the emergency escape lighting of premises
- **BS5499-1 & BS5499-4** Safety signs, including fire safety signs. Code of practice for escape route signing
- **Malta H&S Regs LN 45 of 2002**
- **BS 476 & EN1363** Fire tests on building materials and structures Guide to the principles, selection, role and application of fire testing and their outputs
- **EN54** Fire Detection & Alarm Systems
- **EN3 Fire Extinguishers**
- **MEPA Development Control Design Policy, Guidance & Standards 2015, particularly P53**
- **Development Planning Act, LN227 of 2016**
- **Tech Guidance – Doc F, Conservation of Fuel, Energy & Natural Resources.** (Minimum requirements on the energy performance of buildings regulations 2006)
- **Doc F : VENTILATION**, Building Regulations UK : 2006
- **CIBSE : Environmental Design – Ventilation, Light & Noise Guidelines**
- **EN81-72 : Fire Fighting Lifts.**
- **EN ISO 7010 Safety Signs, Graphical symbols**

NOTES:

The nature of the building - mainly concrete, steel, brickwork, glass and other non-flammable structural elements, and its operation – Industrial / chemical stores - does not generally constitute a high occupancy (in terms of number of staff and hours spent within the stores). However the flammability load may be substantial**. However, the effects of a possible fire in the underlying garage floor should be carefully addressed. This has been taken into consideration throughout our report.

*** It is being assumed that no Fuels or LPG cylinders are stored within the said facility.*

Although the building is low rise and BS5306-1 / MSA-EN-671 does not require dry/wet riser protection, we strongly recommend that an external fire hydrant be

installed at approximately 6 - 10m away from the proposed development structure. This fire hydrant should be connected to the site's existing ring main.

The building includes a wide shutter, which we suggest should be either 4-leaf or 'up & over' type, so that within it, an emergency door may be included. This door should open outwards. Provision for manual opening (i.e. even in the absence of electricity) should be included, if the main shutter is electrically operated.

Note: Electricity Mains should be turned Off when store is not occupied (except for Fire detection, alarm, CCTV, extraction ventilation).

Where several products and equipment will be installed, it must be ensured that the MSA / MCCAA (Malta Standards Authority) standards and Malta Government legal notices are complied with. A case in point where often this is neglected may be: Fire Doors certification, where both the product and its installation MUST be certified.

Note: in this project there are no Fire doors envisaged.

The Operator must insure the premises to cover Fire damage. **The Insurance firm should be copied with this report at an early stage. The Insurance should submit comments if any points require further cover or if they are not in agreement with the approach included in this report.**

4. DRAWINGS

The following list of drawings was submitted by the Architects for our analyses:

- Plan & section
- Site & Block plans

Endorsed copy is attached.

In order to assist the PA, ERA, CPD and the Sanitary Officer, we separated the reports in sections.

VENTILATION REPORT

PART 1 – ASPECTS OF VENTILATION - FIRE SAFETY RELATED

In the event of a fire, the smoke generated within the store or in the underlying garage would quickly fill large volumes, and as the temperature rises, the smoke will rise to fill the compartment.

Given the nature of the operations, i.e. chemical storage, it is understood that the roller shutters will be kept open during work hours, this would help smoke and fumes exhaust. In general, smoke impairs breathing and vision, making safe exit impossible, within a short time. Heat will compromise the structural stability of the building. Hence, **smoke extraction** will prevent toxic environment situations and heat build-up. The CPD may need to remove smoke effectively prior to their entry into the building. The control of smoke build-up can be done in 2 ways, by natural convection – providing dedicated low level & ceiling openings to convey the smoke out of the building AND/OR via mechanical ventilation – smoke extraction fans. The former is available as included in our endorsed drawings; and we propose a total of 1 sq.m cross section area, on opposite walls. Mechanical smoke extraction is highly recommended in these premises, and we propose 6 air changes per hour during operational hours, and 10 air changes per hour triggered by the Fire Alarm system.

PART 2 – VENTILATION: AMBIENT AIR / ENVIRONMENTAL - RELATED

Doc F - VENTILATION, UK Building Regulations 2000, which also makes reference to CIBSE AM10 (Buildings other than dwellings, Natural ventilation of rooms) Extract rates as per tables below applies:

Table 1.5 Recommended comfort criteria for specific applications

Building/room type	Winter operative temp. range for stated activity and clothing levels*			Summer operative temp. range (air conditioned buildings†) for stated activity and clothing levels*			Suggested air supply rate / (L.s ⁻¹ per person) unless stated otherwise	Filtration grade‡	Maintained illuminance§ / lux	Noise ratings§ (NR)
	Temp. / °C	Activity / met	Clothing / clo	Temp. / °C	Activity / met	Clothing / clo				
Factories:										
— heavy work	11–14 ^[11]	2.5	0.85	— ^[12]	—	—	— ^[13]	Depends on use	— ^[14,15]	50–65
— light work	16–19	1.8	0.85	— ^[12]	—	—	— ^[13]	Depends on use	— ^[14,15]	45–55
— sedentary work	19–21	1.4	1.0	21–23	1.4	0.65	— ^[13]	Depends on use	— ^[14,15]	45
Garages:										
— parking	—	—	—	—	—	—	6 ACH (extract)	—	75/300	55
— servicing	16–19	1.8	0.85	—	—	—	—	G2–G3	300/500	45–50

Any non-habitable rooms that have no windows require mechanical ventilation, flow rates as per Doc F – Ventilation, Building Regs UK; or ASHRAE/CIBSE codes.

Wasteserv informed the undersigned that the store will only be accessed to place or removed goods, and staff will not spend hours within the premises. This therefore confirms that the store is not a habitable space. Therefore artificial lighting and mechanical ventilation are acceptable.

FIRE SAFETY REPORT

(i) **General** : BS9999 : 2008 Hazard / risk category:

BS 9999:2008

BRITISH STANDARD

6.2 Occupancy characteristic

The occupancy characteristic is principally determined according to whether the occupants are familiar or unfamiliar with the building and whether they are likely to be awake or asleep. Occupancy characteristics should be determined in accordance with Table 2.

NOTE It is recognized that within each of these categories there will be persons with a range of capabilities present. In some cases these will be known to the premises management. Further guidance is given in Clause 46.

Table 2 Occupancy characteristics

Occupancy characteristic	Description	Examples
A	Occupants who are awake and familiar with the building	Office and industrial premises
B	Occupants who are awake and unfamiliar with the building	Shops, exhibitions, museums, leisure centres, other assembly buildings, etc.
C	Occupants who are likely to be asleep:	
Ci	• Long-term individual occupancy	Individual flats without 24 h maintenance and management control on site
Cii	• Long-term managed occupancy	Serviced flats, halls of residence, sleeping areas or boarding schools
Ciii	• Short-term occupancy	Hotels
D ^{A)}	Occupants receiving medical care	Hospitals, residential care facilities ^{B)}
E ^{C)}	Occupants in transit	Railway stations, airports

^{A)} Currently occupancy characteristic D, medical care, is dealt with in other documentation and is outside the scope of this British Standard.

^{B)} Under some circumstances, residential care facilities may be classified as occupancy characteristic Cii.

^{C)} This occupancy characteristic is included for completeness within this table but is not referred to elsewhere in this British Standard.

6.3 Fire growth rate

The fire growth rate is the rate at which it is estimated that a fire will grow. Fire growth rates should be categorized in accordance with Table 3.

NOTE A building with a high fire load density will not necessarily have a rapid fire growth rate, and low fire load density will not necessarily have a slow fire growth rate.

Table 3 Fire growth rates

Category	Fire growth rate	Examples	Fire growth parameter ^{A)} kJ/s ³
1	Slow	Banking hall, limited combustible materials	0.002 9
2	Medium	Stacked cardboard boxes, wooden pallets	0.012
3	Fast	Baled thermoplastic chips, stacked plastic products, baled clothing	0.047
4	Ultra-fast	Flammable liquids, expanded cellular plastics and foam	0.188

A) This is discussed in PD 7974-1.

WE LIST CLASSIFICATION & CATEGORY AS FOLLOWS:

- STORAGE SPACES: A-2
- INDUSTRIAL AREA : A-2

All materials used for construction have zero fire load;

All finishes and furnishings MUST be fire retardant certified materials. (E.G. DO NOT USE TIMBER)

The introduction of fire protection measures recommended here below will lower the risk category.

The layout of the building as well as its use and the nature of its occupancy have been reviewed in conjunction with the *Design guidelines on fire safety for buildings in Malta – Vol. D / Draft Building regulations, issued in March 2004 by the BCID; and* BS9999:2008.

All Fire protection systems and equipment shall comply to the MSA – EN or BS standards quoted in this report.

Structural Fire resistance shall be REI-90min. Architects to certify.

(ii) Travel distance to Escape Routes

The “means of escape” are the *structural means whereby safe routes are provided for persons to travel, by their own unaided efforts, from any point in a building to a place of considerable safety.*

Recommendations: In carrying out a Fire Risk Assessment of proposed building plans, we review the three aspects which will lead to effective management of the Significant Hazards: (i) Prevent, (ii) Protect, (iii) Evacuate. In the case of the latter aspect, one needs to assess **Who** (especially disabled, children, elderly), **Where** (location w.r.t exits), **When** (time of day/night, rush hours, un-attended hours) and **Why** (e.g. people may be asleep and unaware...) occupants may be in danger.

Obtaining information from the operator and designers and answering these questions provides a better understanding of how *Safe Egress* from buildings should be provided.

- ❑ According to BS9999:2008, the maximum travel distance for most areas within this project are:

BRITISH STANDARD

BS 9999:2008

17.4 **Travel distance**

The travel distance should generally not exceed the value given in Table 12 for the appropriate risk profile; however, if additional fire protection measures are provided the travel distance may be increased subject to certain limitations (see Clause 19).

NOTE 1 The travel distances recommended in this subclause are based on the time available to travel safely to an exit (see Clause 11).

NOTE 2 These distances have been determined according to the risk profile (see Clause 6), taking into account the following issues:

- a) Distances need to be shorter for higher fire growth rates or where the occupants are unfamiliar with the building.
- b) Distances may be longer when additional fire protection measures are provided (see Clause 19).
- c) A person escaping might not go direct to their storey exit in the first instance.
- d) Speed of movement can vary widely according to the occupancy characteristics.
- e) Pre-movement time can vary with the size of room, the occupancy characteristics and the management provision.

Table 12 Maximum travel distance when minimum fire protection measures are provided ^{A)}

Risk profile	Travel distance, in metres (m)	
	Two-way travel	One-way travel
A1	65	26
A2	55	22
A3	45	18
A4 ^{B)}	Not applicable ^{B)}	Not applicable ^{B)}
B1	60	24
B2	50	20
B3	40	16
B4 ^{B)}	Not applicable ^{B)}	Not applicable ^{B)}
C1	27	13
C2	18	9
C3 ^{B)}	14	7
C4 ^{B)}	Not applicable ^{B)}	Not applicable ^{B)}

Where exact travel distances are not known, direct distances should be taken as two thirds of the travel distance.

These distances (A2 > 55-22m) stipulated have been met throughout this project.

- ❑ The Fire load needs to be kept as low as possible; particularly in escape routes such as stairs, corridors and emergency exit doorways;
- ❑ Adequate exit signage and illumination shall be provided.
- ❑ Lobbies should be introduced where possible.

Considerations : All escape route doors, fire doors and corridors must have a clear width of **minimum** 1000/1100mm (depending on location) and height not less than 2000mm. It must be ensured that the direction of door-opening is always in the flow direction of escape.

No door on an escape route shall be locked. If access control is required for security reasons, then these doors must fail safe OPEN in case of emergency, and must include a measure to open door manually (push button or key in (green) break glass box).

Include : (a) suitable hand and barrier railings to help prevent escaping personnel from falling; and (b) anti-slip tape or rough thread edges on steps.

Include panic door handles as necessary, adequate illumination, signage and avoid steps or unusual ramps.

Emergency Exits shall include mandatory (maintained) **Emergency Lighting** to BS5266 and **Safety Signs** to BS EN ISO 7010:2012+A5:2015

E	F	M	P	W
Evacuation route, location of safety equipment or safety facility, safety action (safe condition sign)	Fire equipment signs	Mandatory action signs	Prohibition signs	Warning signs
				
E001 Emergency exit (right hand)	F001 Fire extinguisher	M001 General mandatory sign	P001 General prohibition sign	W001 General warning sign

Escape routes require to be free from any obstacles, and clearly marked with signage providing easy exit.

(iii) Compartmentation & Structural Stability

Compartmentation is the division of a building into '*fire-tight*' compartments by fire resisting elements of building construction in order to contain fire within the compartment of origin. This can be achieved by completely separating different zones by fire resisting walls. All penetrations such as doors, windows, ductwork and pipes can be treated as above. **Different floors are also to be treated as separate fire compartments.**

Compartment walls shall reach from finished floor to the slab above forming continuity. Non compartmented walls may stop just above a false ceiling.

Gypsum partitions acting as fire rated walls, shall be: Stud Gypsum construction walls min 70mm thick, 30/60REI, 12.5mm fire rated certified boarding, on both faces, including taping, jointing, Rockwool infill and 2 coats vinyl acrylic non-toxic paint. Where higher REI-rating is required, use double gypsum board layers.

(iv) **Fire Load**

This is the amount of fuel within a particular area which will burn to release heat and feed the fire.

The materials used for both the structure (concrete & Maltese stone) and the finishes (sand-cement mortar & water-based paint) usually present minimal (or 'nil') heat release, flame spread, and minimal production of toxic fumes.

Any other flammable products used, materials stored and finishes shall be listed and adequate fire protection shall be provided.

Quantities shall be contained such that risk of fire and explosion is restricted. Chemicals which may react with each other must be segregated, and separated by fire refraction walls.

(vii) **Fire Detection**

An automatic fire detection system in compliance to BS5839-1 and equipment to EN54 would provide 24-hour surveillance for any signs of combustion throughout the premises. If the system is properly designed, it would provide a very early warning & alarm. This would enable early emergency response, thus minimizing the re-instatement costs related to fire damage. The detection system Fire Alarm Panel shall be linked to the Operator' s security staff via auto-dialler. These, in turn should alert the CPD.

The Detection system shall include: Fire resistant cable with several devices on the loops. Manual call points, bells, sirens, flash/strobe lights, heat detectors, (ionization/optical/beam) smoke detectors, flame detectors, Multi-sensor detectors, (carbon monoxide and LPG leak detectors – where applicable). Note: Flame detectors are required in these premises.

We recommend gas leak detectors and alarm. Wasteserv specialists should determine which gases are likely to be released in the event of a leak, these may include carbon monoxide, and other deadly or explosive gases. The detection system should trigger the alarm and actuate the extraction fans. **It should be determined whether explosion proof (ATEX) fan motors and lighting power systems are required.**

The system must include the necessary audible (75-90 dB(A)) and visual devices according to the situation and the persons occupying the rooms.

Design shall incorporate all the necessary interlocks with relevant equipment such as fans, etc.

A properly designed detection system must cover all areas. The system should comprise a conventional series of detectors all linked to a fire alarm panel (FAP) forming various recognizable fire zones. *This system **is mandatory**, for all areas of the building. Design system to Life safety category L1.*

(viii) **Fire Suppression Systems**

The fire **protection** of this project includes: *means to aid the CPD (external hydrant), manual suppression systems (extinguishers), early warning and detection, effective Smoke & Heat extraction systems which maintain low temperatures thus extending the resistance of the structure stability, adequately sized means of egress. The Evacuation strategy is meant to rely on Fire Service (CPD). Therefore, the fire alarm should warn occupants preparing them for egress without the need for external assistance. The 'Cause & Effect' matrix therefore should include well-planned evacuation strategy.*







This option is a package of various systems that, together, bring about an acceptable level of protection. It must be clarified that each of the components of this package is indispensable and careful design and maintenance of these is essential. However, we point out that without effective management and training, the above measure may not be sufficient.

The proposed package consists of:

- Multi-sensor detection system or heat trace cable, with strategically programmed fire alarm panel and control; and adequate sounders and flash lights for warning occupants.
- Flame detection
- External hydrant to BS5306-1 / MSA 671-1.
- Fire extinguishers, safety signage, emergency illumination, manual alarm call points.
- Smoke and heat extraction via the adequate natural ventilation provided

- Strict implementation of fire compartmentation
- Fire retardant finishes & materials, REI-90min Structure – Architects certified

All areas shall be protected by portable fire extinguishers as follows:

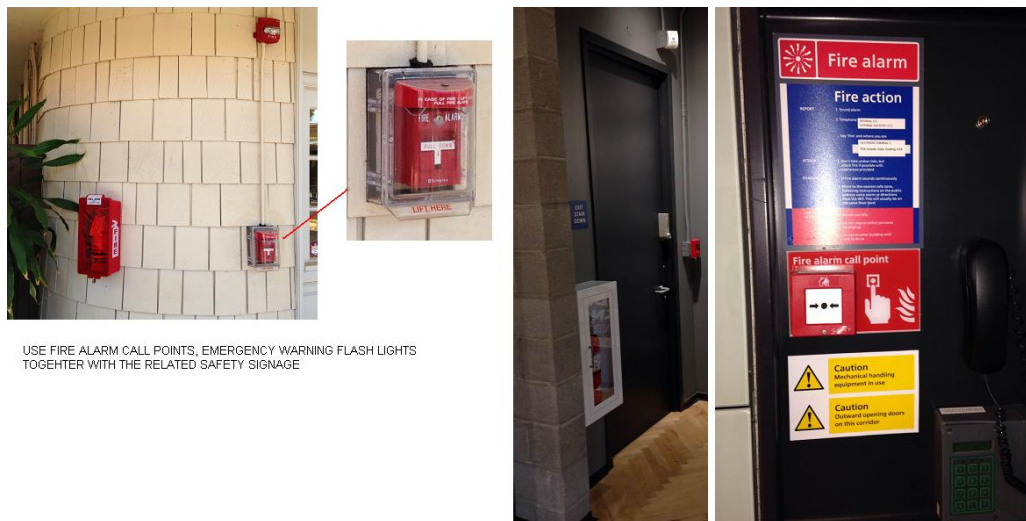
Class	Type of fire	Extinguishing method	Type of extinguisher
	Fires involving solid materials, usually of an organic nature. Combustion takes place with the formation of glowing embers (carbonaceous fires)	<ul style="list-style-type: none"> • Cooling • Cooling and smothering • Smothering and chemical interference 	<div>Water</div> <div>Foam</div> <div>Powder (ABC type)</div> <div>Halon 1211 (BCF) *</div> <div>Wet chemical</div>
	Fires involving flammable liquids or liquefiable solids	<ul style="list-style-type: none"> • Smothering • Chemical interference • Smothering and chemical interference 	<div>Foam</div> <div>Carbon dioxide</div> <div>Powder (ABC type)</div> <div>Powder (BC type)</div> <div>Halon 1211 (BCF) *</div>
	Fires involving flammable gases	<ul style="list-style-type: none"> • Starvation: turn supply of gas off • Chemical interference (only to be done if gas supply can be stopped, otherwise leave to burn) 	<div>Powder (ABC type)</div> <div>Powder (BC type)</div>
	Fires involving flammable metals **	<ul style="list-style-type: none"> • Smothering 	<div>Powder (D type)</div>
	Fires involving electrical equipment	<ul style="list-style-type: none"> • Smothering • Smothering and chemical interference 	<div>Carbon dioxide</div> <div>Powder (ABC type)</div>
	Fires involving cooking oils and fats	<ul style="list-style-type: none"> • Smothering and cooling 	<div>Wet chemical</div>

Manual call points are required at all escape routes, as indicated on drawings.

External and internal fire alarm sounders and flash lights are required as indicated on drawings.

A Fire-man' s Main switch at the service entrance is recommended, this would shut down electrical power, when the CPD decide that this is necessary.

Appropriate signage and Instructions (for CPD & security, fire marshals staff) are required at the front shutter.



(ix) Safety Signs and Emergency Illumination

To evacuate a building during an emergency, it is vital that all exit routes can be safely followed leading to a place of safety. Lighting and signage is of particular importance to people who are unfamiliar with the building layout, or in major smoke-filled scenarios, where even trained staff may lose orientation or judgement. A properly designed system will include installed and maintained emergency lights ensuring all relevant areas stay lit for sufficient time for all to escape and other measures safely taken.

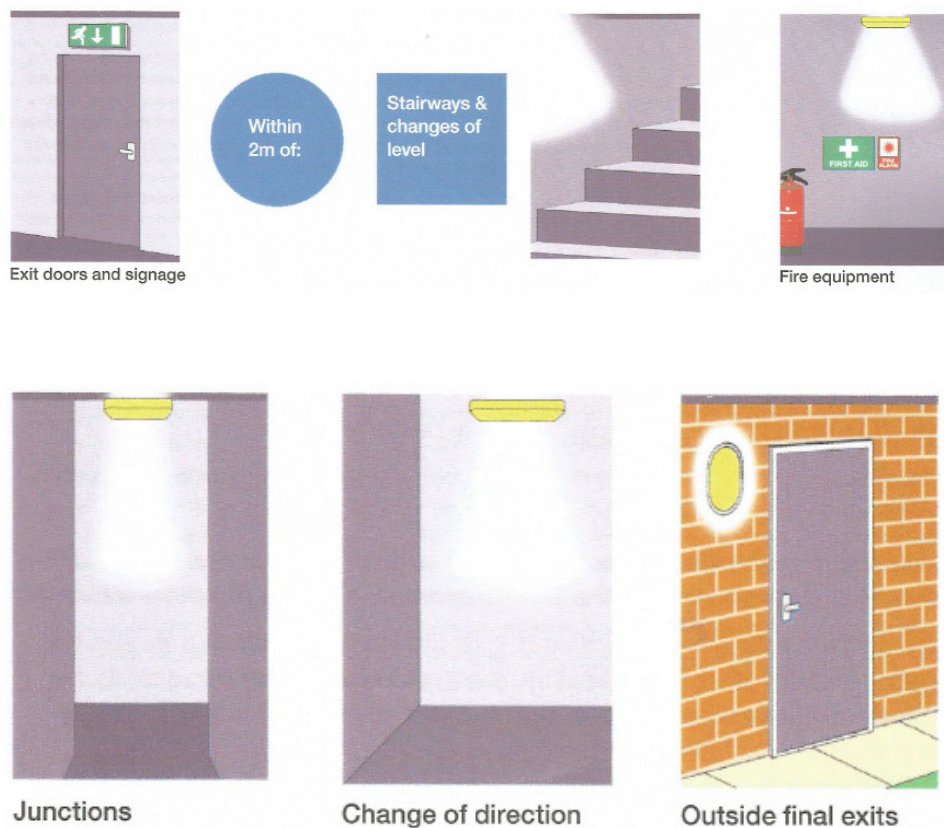
Emergency lighting design shall be in accordance to BS-EN1838 and BS 5266-7.

Non-maintained lighting refers to fixtures which light up when the mains power fails. During (non-emergencies) the units draw charge current to keep the built-in batteries topped. Normal lighting will illuminate all areas up to the stage where electric power is interrupted, either due to system failure, or by the CPD who may turn off power for water-based fire-fighting safety. At that point, the battery-backed units will turn ON and must be designed to provide a minimum of 0.5 to 1lx.

A maintained luminaire is one which has to remain ON at all times, providing adequate lighting, even during non-emergency times. Usually these fixtures are backed by generator supply.

Properly designed lighting and signage will facilitate a quicker exit time for persons who are not aquatinted with the building.

Site Emergency Lights as follows:



(x) Access and Facilities for Fire Service

Access to the CPD is straight forward and there are no issues.

(xi) Internal Control, Fire drills, fire & safety management

Personnel must be trained in basic fire-fighting and an emergency plan should be drafted. Regular maintenance and inspections shall be carried out and logs shall be kept. Residents, general public and personnel must also be made aware of fire evacuation procedures through effective sign posted plans and safety signage.

Fire Risk Assessments will be necessary in order to draw up a cause and effect matrix which shall serve both the FAP programming, and in drawing up a Fire Strategy.

This report is based on the drawings submitted. The complexity of the building, may require subsequent report updates depending on the status of the development, possible changes and clarifications requested.

LIGHT REPORT

We have reviewed all areas in this project, and based on the plans and information supplied by the designers we verified the following:

- That there will be sufficient light fittings to provide day-light minimum lux levels.
- That the illuminance is well distributed providing very low glare and optimal contrast
- That LN227 of 2016 is adhered to.

In so far as light fixtures are concerned artificial lighting will be designed in accordance with the requirements of the CIBSE – The Society of Light and Lighting and taking into account:

- Legal Requirements & Emergency Lighting.
- Maintenance.
- Energy Efficiency and Sustainability.
- provide sufficient lighting levels related to the work being carried out.

Typical illuminance values: obtained from **CIBSE SLL Lighting GUIDES**, in particular, **Guide 10 lighting for the built environment; Guide 12 Emergency lighting:**

Following is a schedule of areas and the recommended average Lux levels.

Staircases	150 Lux @ on tread
Plant Rooms	200 Lux (general)
Stores for bulky items	200 Lux (general)
Stores for small items	300 Lux (general)
Switch rooms	300 Lux (general)
Staff rooms (Changing/lavatories)	100 Lux (general)
Emergency Lighting	0.5 – 1.0 Lux

The Luminous Efficacy (measure of how well a light source produces visible light) = ratio of luminous flux to power:

The ideal ratio to be 110 lumens of light output per watt of electrical energy.

All the storage area is a non-habitable floor and therefore shall depend on artificial lighting.

Battery back-up 2hrs for all emergency lights.

NOISE MITIGATION

The site for this development is known for significant traffic and congestion. The noise generation from an operation should in general never **exceed 5dB that of the measured background (existing) noise levels.**

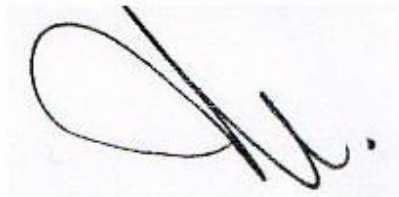
The main noise generating sources are equipment and plant which will generally operate during a power failure (generators) or for fumes & smoke evacuation purposes. These are deemed exceptional situations.

Other Sources of noise include the mechanical work shop machinery. However, these will not impact on the overall noise generation of the Sant Antnin Plant; which is classified as an industrial site, and is significantly distant from residential dwellings.

This specific development relates to storage, therefore the actual noise at nearest third-party receptors will be negligible.

RESIDUAL IMPACTS : No residual impacts are envisaged following mitigation.

I confirm that the recommendations re Fire Safety, Ventilation, light and noise emissions / mitigation measures contained in this report renders the development safe for the users and will comply with international standards, regulations & laws. CPD approval is requested.

A handwritten signature in black ink, consisting of a large loop followed by a series of smaller, connected strokes, ending with a period.

FIRE SAFETY SUMMARY:

1. No matter the distance of the building from the rest of the facilities; a fire hydrant needs to be positioned at a distance of 6-10m away from the said building. This hydrant is necessary for the CPD to draw water to fill their bowsers and fight a fire. The civil works will involve trench works approx. 600mm wide by 1000mm deep from the nearest available hydrant or buried ring main. The trench will need a compacted sand bedding, placement of a 4" hydrant line, burying with sand, compaction, placement of marker blocks/tiles/slabs, warning tape, back filling and re-instatement of finished flooring.
2. The building will need internal segregation, by means of 230mm HCB walls infilled with concrete, these walls shall act as fire refraction walls between different category storage materials which are flammable. We are currently doing similar works at Wasteserv Malta North [refer to Stefan Salomone H&S], for the different type bales stored outdoors. In your block, we need to separate oils, fuels, chemicals, paper/cardboard/timber, paints & thinners, etc., from EACH OTHER. The reason is that of containing a fire to limited fuel loads, and also because fires may need different media for extinguishment (e.g. you use foam for fuels but you may need dry powder for chemicals). The segregation walls need to be 300mm higher than the storage height.
3. The top of the storage room/s need smoke and fumes venting. We therefore need to introduced permanently open windows with steel louvers and mesh (for prevention of

insects, rodents, arson....cigarettes/matches thrown in). usually a minimum of 1 sq.m is required, but it depends on the room area/s.

4. It is highly recommended that the access shutter door is fitted with louver grilles also at the bottom, this is necessary for the venting of fumes which may be denser than air, e.g. LPG, Carbon monoxide...
5. We suggest that the electrical installation is turned OFF from a main switch near the main access door.
6. We suggest that essential mechanical ventilation, artificial lighting, toilet facilities; emergency eye/shower; first aid kit are provided if personnel will spend hours inside these premises.
7. The ERA requires bunding around fuels and chemicals. This is to contain leaks and prevent the liquids to reach the water table or the main sewer.
8. Any highly flammable or dangerous goods may need to be stored under lock & key in separate rooms, which we suggest are constructed to class REI-60, and fitted with certified fire door.
9. We strongly recommend an alternative exit door way, located at an angle of 45 deg away from the main door way (i.e. the second exit must be reasonably sited away from the first so as to provide alternative safe exit if the first door is blocked by fire) Doors should be fitted with panic bar hardware.