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**Fire Protection  
Association  
Member 2022**

Messrs. WASTESERV  
ECOHIVE complex, Tul il-Kosta  
In-Naxxar, NXR9030

Mr. Stefan Salomone – WSM Senior Manager H&S  
C.c. Ing Roberta apap – Fire Engineer – WSM

2<sup>nd</sup> March 2022

REV 1

Dear Sirs,

#### **FIRE SAFETY, LIGHT & VENTILATION REPORT – PROPOSED NEW MRF PLANT - AD SITE WITHIN WASTESERV MALTA NORTH – Rev 1**

Please find hereunder Report requested by PA & CPD for planning application purposes. This report is based on (i) Meetings held with Wasteserv Senior officials, where the proposed operations have been described, and, (ii) a site inspection where the existing Compost shed and other areas to be converted into the proposed MRF have been observed. Some technical information supplied by Mr Nathan Gatt, Ing Kristian Zammit and Ing Roberta Apap of Wasteserv was also reviewed. Whilst the site essentially is already existing, the 'change of use' will result in only minor aesthetic modifications and construction. The Shed will be 'closed-sided' and will include 3 cabins within. There will also be a dedusting system. Whilst this would be a specialized 'design & build' project, detailed plans indicating machinery and partitions layout are not yet available, however the 'open' shed would be totally enclosed with fire resistant paneling and minor walls would be erected. ~~This is REV 0~~ This is Rev 1 of the previous report issued on 12/01/2021 ~~Report and~~ updated versions may be due upon receipt of more detailed information. We clarify that the report analyses the fire risks, illumination and ventilation requirements for the existing but modified Compost SHED. However, whilst considering that the remainder of the existing plant is already adequately protected (*Ref Fire Risk Assessment Reports 2020*); the overall AD site fire Risk factor will increase, therefore we have reviewed the complete site's hydrant layout and other safety features. A new Fire-pump and reservoir assembly are being installed catering for the recommended fire protection systems mentioned within this report.

~~Since, we currently do not have any finalized proposed drawings,~~ we have prepared a report on the basis of existing site plan, satellite photos, and site inspection photos. REV-1 updated, more detailed plans have been received, and this is an updated report.

We are aware of the nature of the operations within the AD plant, and that the proposed shed is sited within a site which includes a Methane/Biogas 'bubble', CHPs, Chemical stores and other major process water tanks.

We are informed that the AD facility does **not include** [Rev 1 - changed to this statement due to received information & ongoing design with WSM for new fire pump]

- An Underground Water reservoir dedicated to Fire fighting. An existing, large water reservoir underneath the shed will be converted and adapted for Fire-fighting water storage.
- A new, Fire Fighting Pump Set will be installed, within a newly-built pump room – works currently ongoing.
- Monitors, Hydrants and hose reels. [as per this report, new systems are being installed]

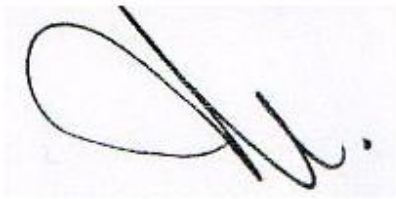
This Report lists the minimum Fire Safety requirements which must be included in the proposed **new development**, as set out in current legal notices, guidelines, standards and codes of practice. It is the responsibility of the project owner/developer to ensure that these structural, finishes and building services works are carried out professionally and certified prior to our inspection for the issuance of a compliance certificate.

The report is based on the information supplied. The contents of the report may need to be reviewed if parameters are changed. E.g. Quantities of/ type of products stored, distances from buildings and boundaries, differences in hazards assessed, personnel present on site, different types of product stored, etc. The Operator MUST inform the PA, CPD, OHSA, REWS and the undersigned if there are changes as the project develops.

We point out that any aspects of Health & Safety, will be handled by Wasteserv H&S officers. Therefore, we clarify that our report covers only Fire Risk & Ventilation. Other Risks such as Structural failure and operations-related hazards are not covered by this report.

Trusting the foregoing will provide sufficient information for your assessment,

Kind regards,

A handwritten signature in black ink, appearing to read 'F. Stivala', with a large loop at the start and a small dot at the end.

**Ing. Fabio Stivala      Warrant 473**  
B.Eng (Hons) MI Fire E, MISPE, Eur.Ing.  
Building Services & Fire Consultant  
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## **FIRE RISK ASSESSMENT REPORT – PROPOSED CONVERSION OF SHED – WASTESERV MN AD PLANT**

**Wasteserv plans to change the use of the Compost shed at the AD Plant :** The original MN design was for black bag and bulky refuse. Whilst the Organic was aimed for the Sant’Antnin plant. However the incidents at Sant’Antnin necessitated changes in operations at MN.

Wasteserv added more sorting staff on the conveyors. Although the IN/OUT total waste is more or less the same, the finer sorting resulted in less RDF but a higher recyclables fraction. The plant is operated for longer hours due to the better sorting process.

During 2020 Sant’Antnin plant was closed therefore all organic waste was also directed to MN. The COVID scenario temporarily resulted in black bag directly being landfilled.

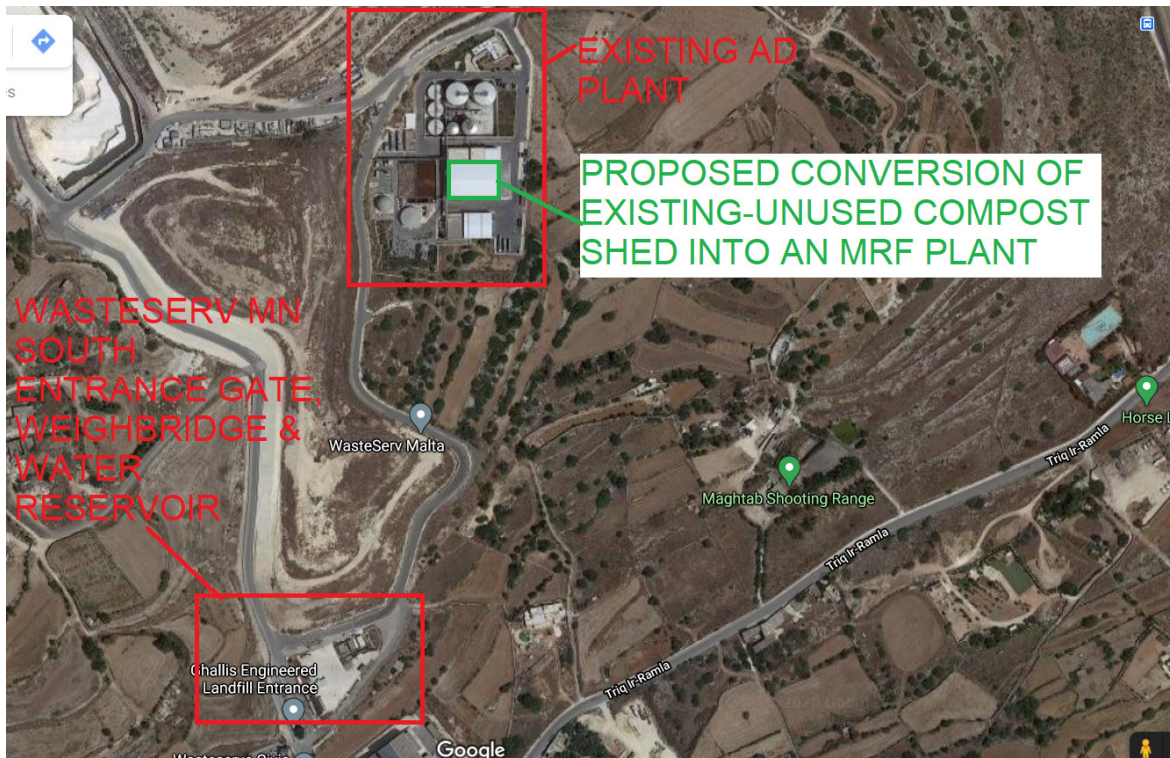
Wasteserv proposes to add more sorting machinery for the larger volumes of recyclables and this is being proposed for the area within the AD compost shed which is not used fully.



However, this will require a new fire fighting system, including external hydrant, hose reels, etc. Water reserve and new pumping arrangements will be installed ~~near the existing 17000m<sup>3</sup> reservoir/s at the site south security gate (near weighbridge and CA site), some 400-500m away from the AD site.~~ [within the AD site, utilising a large underground reservoir situated underneath the Compost shed. A new fire pump room will be built within an excavated space, adjacent to the reservoir \(but outside its perimeter, providing safe access to the CPD\) WSM engineers and the undersigned are currently designing this system, which will include a carefully designed suction pipework and priming arrangement, all in compliance to EN 12845:2015.](#) The new design will thus bring about several fire protection upgrades within the whole of the AD plant area.

## 1. THE SITE

The site is shown here below:



## 2. DESCRIPTION OF PROCESS (as presented by Wasteserv – Ing Nathan Gatt – Facility Manager, MBT North)

A new Sorting Line for the 'Grey Bag' will be introduced within the Existing Compost Shed at the Malta-North AD plant.

A Reception Hall will be built over the South Gate Water Reservoir, and this will receive Grey Bag (circa 450 Tons will be stored at any one time).

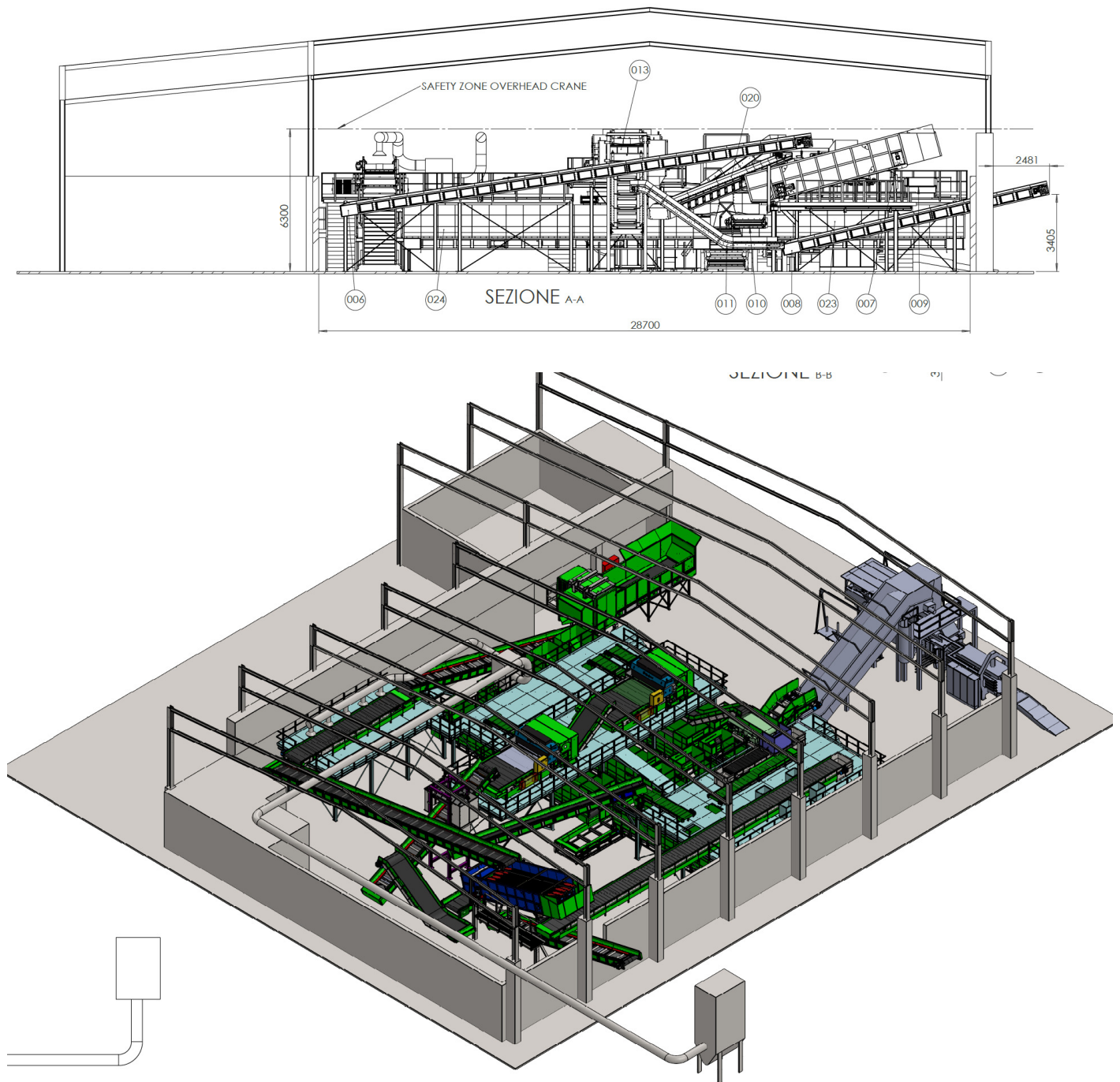
The Material will be transported to the AD plant new sorting line and there will be a process flow of 8-10 Tons/hr. There may be up to 50 Tons stored overnight within the sorting shed, and another 20 tons in open-top containers 'stationed' in the nearby parking bay.

The reservoir situated underneath the AD Shed, is partitioned into 3 sectors has a capacity of  $17,000\text{m}^3 \times 9\text{m}$  depth, and includes rain water fill gutters-pipes falling from the shed's roof. Silt and straining grates must be installed in order to prevent large solids, paper & plastic bags reaching the reservoir, and blocking the pumps &/or suction inlets. The shed will include 3 cabins and a dedusting system.

The Existing Compost Shed will be converted to a sorting line housed within completely closed sides (in fire resistant sandwich paneling) and include  $120\text{m}^2$  shredded grey bag material (50T) reception area. The flow of material shall be 8-10T/hr. The shed is located approx. 43m away from the gas bubble.



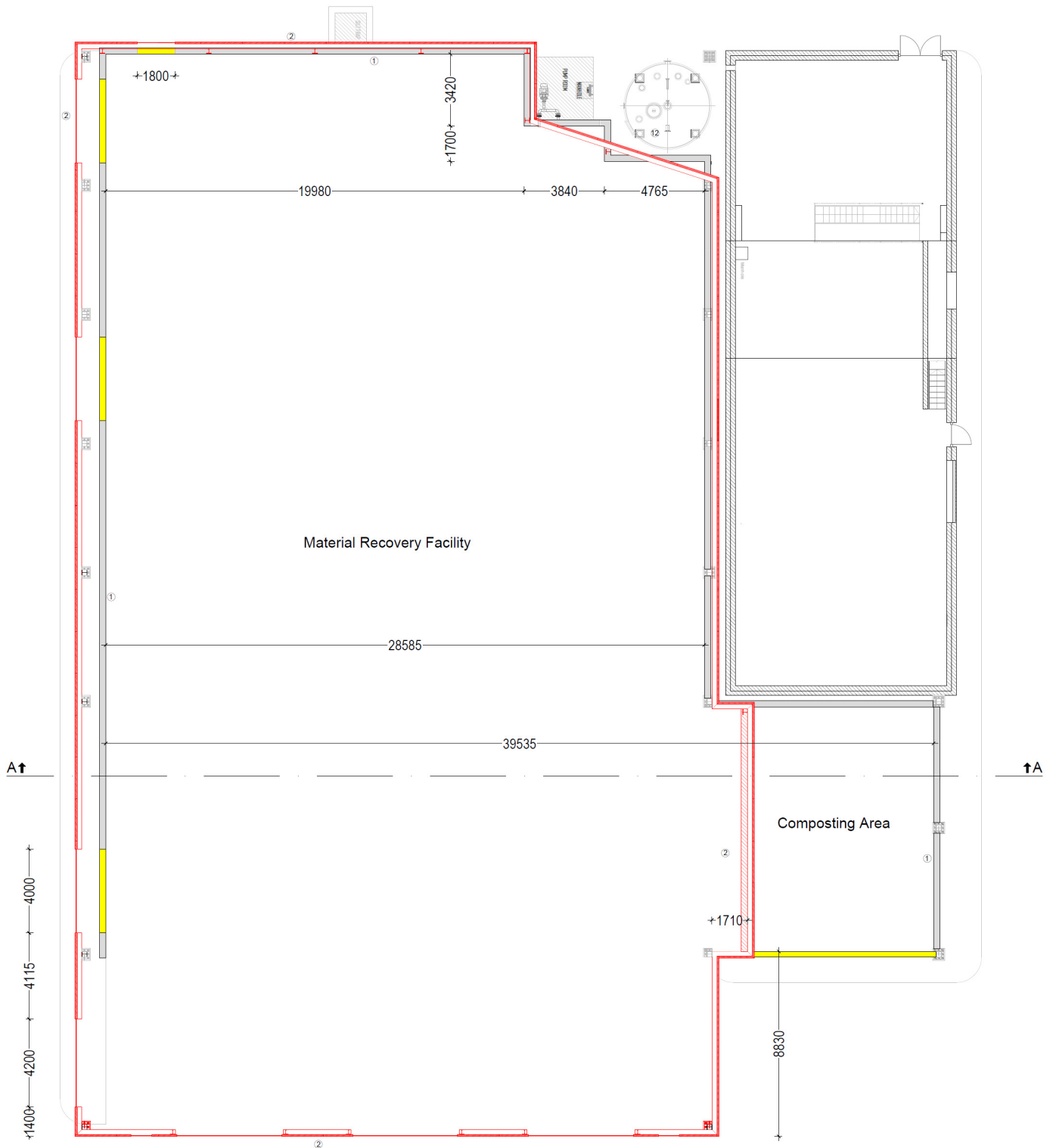
The sorted OUTPUT will be stored temporarily in open top containers (20T) outside the compost shed. The loose material will then be baled and transported to the bales storage area at the MBT plant. No bales will be stored at the AD plant.



Detailed drawings are available at WSM Engineering team.

The plan below shows the proposed (fire-resistant) shed cladding;

Proposed Plan - Ground Level  
Scale 1:100 on A1



The products or materials contained in the 'grey bag' and processed within the proposed shed are:

- Paper, card, PET, magazines, books, newspapers
- Plastics, sheets, bottles, solid items, plastic food packets
- tins, spray cans and wrappers



The number of **Wasteserv staff** working on the sorting line, and within the shed is expected to be around **30**. (50-60 on 2-shifts)

#### OVERVIEW:

Although the main objective is that of Protecting life (of the occupants/staff during evacuation and the CPD upon reaching site and fighting the fire) we have looked at Fire safety engineering solutions that should provide sufficient protection of Property (structure) and contents (machinery), as well as the environment, through active & passive fire protection, as well as Management Preventive measures.

### 3. REVIEW OF BLOCK PLAN & FIRE ENGINEERING RECOMMENDATIONS

#### (i) General

The layout of the premises as well as its use and the nature of its occupancy have been reviewed in relation to BS9999:2017 and the national guidelines on Fire Safety for buildings in Malta.

All Fire protection systems and equipment shall comply to the relevant MSA – EN or BS standards.

#### (ii) Travel distance to Escape Routes

##### ▪ *Means of Escape and Protected 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/site to a place of considerable safety.*

##### ▪ *Recommendations*

**In assessing the Risk Profile, we observe, the area under shed would fall under Occupancy Characteristic A-3 or A-4:**

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 <del>or</del> boarding schools
Ciii	• Short-term occupancy	Hotels
D <del>A</del>	Occupants receiving medical care	Hospitals, residential care facilities <del>B</del>
E <del>C</del>	Occupants in transit	Railway stations, airports

Risk profile	Travel distance, in metres (m)			
	Two-way travel <sup>B)</sup>		One-way travel	
	Direct	Actual	Direct	Actual
A1	44	65	17	26
A2	37	55	15	22
A3	30	45	12	18
A4	Not applicable <sup>C)</sup>	Not applicable <sup>C)</sup>	Not applicable <sup>C)</sup>	Not applicable <sup>C)</sup>
B1	40	60	16	24
B2	33	50	13	20
B3	27	40	11	16
B4 <sup>C)</sup>	Not applicable <sup>C)</sup>	Not applicable <sup>C)</sup>	Not applicable <sup>C)</sup>	Not applicable <sup>C)</sup>
C1	18	27	9	13
C2	12	18	6	9
C3 <sup>C)</sup>	9	14	5	7

We observe that for single direction escape, 18m is the allowed max distance. The shed currently only has one exit route, and the shed dimensions exceed 40m; thus, a new exit doorway needs to be provided.

This is best located at the rear of the shed, however, a detailed re-design should be carried out once the final sorting line plan layout is available. [WSM – To action](#).





It is important to observe that these escape routes comply with the following requirements:

- ❑ There must be No obstructions to the exit routes, particularly in escape routes such as stairs, corridors and emergency exit doorways; at all times.
- ❑ Adequate exit signage and illumination shall be provided, including photoluminescent-paint floor markings indicating the exit route, as instructed by the CPD during their site visit at MN -MTP 2-years ago.

Refer to endorsed plan drawing with our comments.

(iii) Fire doors / Access Panels

Definition & Classification (applies to fire walls, slabs and doors)

R = Structural fire resistance in minutes

E = Integrity in minutes

I = Isolation in minutes

Additional Classification for Fire doors:

C = self-closing

S = smoke-tight

Fire doors are required to separate escape ways from open or common areas. Services shafts should have access panels / doors fire rated to the same rating as the compartmentation walls and ceilings. Fire compartments will therefore include fire doors as apertures. Vision panels are recommended.

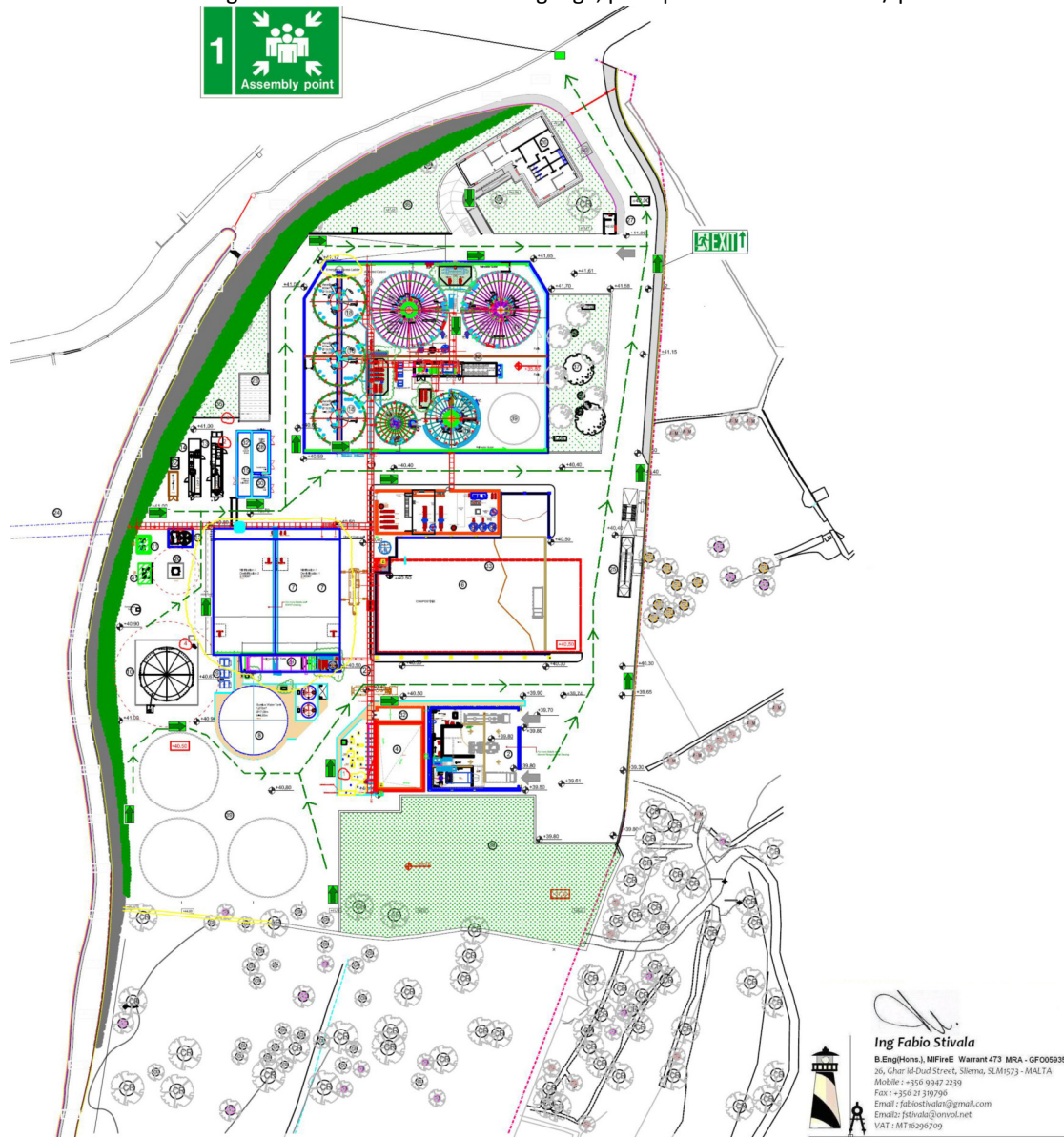
All doors referred to as 'Fire doors' shall be certified compliant to standard EN16034, EN13501-2, EN1634-1 and EN1634-3. These shall be certified from an accredited laboratory and as per MSA requirements.

**All doors shall include self-closing devices in order to maintain compartmentation integrity, however, under no circumstance should an escaping occupant find an escape door locked.**

Where glass apertures exist in fire compartment walls, then these must be fire rated. We should suggest the use of (fire retardant) Polycarbonate for natural light rather than glass.

Where ventilation / air transfer grilles are used in fire compartment walls, then these shall be proprietary grilles which are not only fire resisting, but also fire stopping through their self-sealing properties in a fire situation. Self-closing fire dampers shall be used in duct work which crosses fire compartment walls.

Doors leading to the outside shall include signage, push pads or lever handles / panic bar.



(iv) Shafts

All services shafts shall be adequately plastered or finished to form a sound REI-90min /1.5hr fire compartment. There should be no cracks or holes which could allow spread of smoke to other floors or zones.

All building services penetrating fire compartment walls shall have the following accessories:

- Fire sleeves / collars or fire stop expanded foam on all PVC / PB/ PE / PP pipe work > or = to 40mm dia.
- The void around smaller pipe diameters may be made good with cement-sand mortar.
- Trunking and cable trays crossing through walls shall have the wall penetration hole blocked off with fire resisting foam or intumescent mastic.

(v) Compartmentation & Structural Stability; General Construction & finishes

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.

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

The Steel structure shall be hot-dipped galvanized, and all primary structural members, namely the columns, rafters, Purlins and bracing shall be coated with intumescent paint which shall provide a 1.5-hour / 90 Min [R-90] fire protection. The intumescent coating shall be applied as per manufacturer's specifications and in accordance to BS 476 part 21 for load bearing structures and a certificate will be required. The fire-retardant paint shall be suitable for interiors; however, any steel parts of the structures which shall be exposed shall be coated with similar spec paint suitable for Malta outdoors conditions (UV/Temperature/marine salt corrosion conditions. Superior products shall be used, typical brands are Zeroflame, Nullifire, Jotun, International, Thermoguard or equal and approved. Use only approved undercoat layers. Contractor calculating expected fire temperature shall base their work on Cellulose fires and data as follows:

- Certification to EN13381-3
- Steel softening / deformation temp Assume 500-650 °C
- **Design temperature < 520°C** (note this is the temperature of the steel under the paint skin, which we do not want to exceed)
- Contractor to ensure that the correct paint loading tables are selected, and thus the extrapolate minimum paint coat vs steel thickness vs temperature and for 90 minutes resistance; e.g.:

 <p><b>Recommendations</b></p> <p>Within the building industry and specifically fire protection, it has been commonplace when calculating dry film thickness requirements to follow historic ASFP guidance and use the critical failure temperatures of 550°C for columns, 620°C for beams and 520°C for hollows.</p> <p>However, with the introduction of the ASFP Yellow Book 5, two fire designs were put forward to be followed.</p> <p>Both BS5950 and BS EN 1993 (Eurocode) are structural steel designs only and have no relation to specific fire test standards for intumescent coatings.</p> <p>Concerning the Eurocode design, it should not be confused with meaning that only European Fire Test data (EN 13381) can be used.</p> <p>As BS EN 1993 is purely a design code for structural steel, BS476 fire test data is acceptable and commonly used within the UK market.</p>	 <p>The below table can be used when determining which critical failure temperature should be used (see below flowchart)</p> <p>It should be noted however if a fire engineer is comfortable for the historic ASFP guidance temperatures be used, then as manufacturers we are also able to provide loadings based on them.</p> <p>Tremco CPG UK Limited reserve the right to alter the below flowchart without prior notice, in line with company policy of continuous development and improvement.</p> <p><b>Technical Service</b></p> <p>Nullifire has a team of experienced Technical Sales Representatives who provide assistance in the selection and specification of products. For more detailed information, service and advice, please call Technical Services on 01942 251 400</p>
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# SC803 Loading Tables

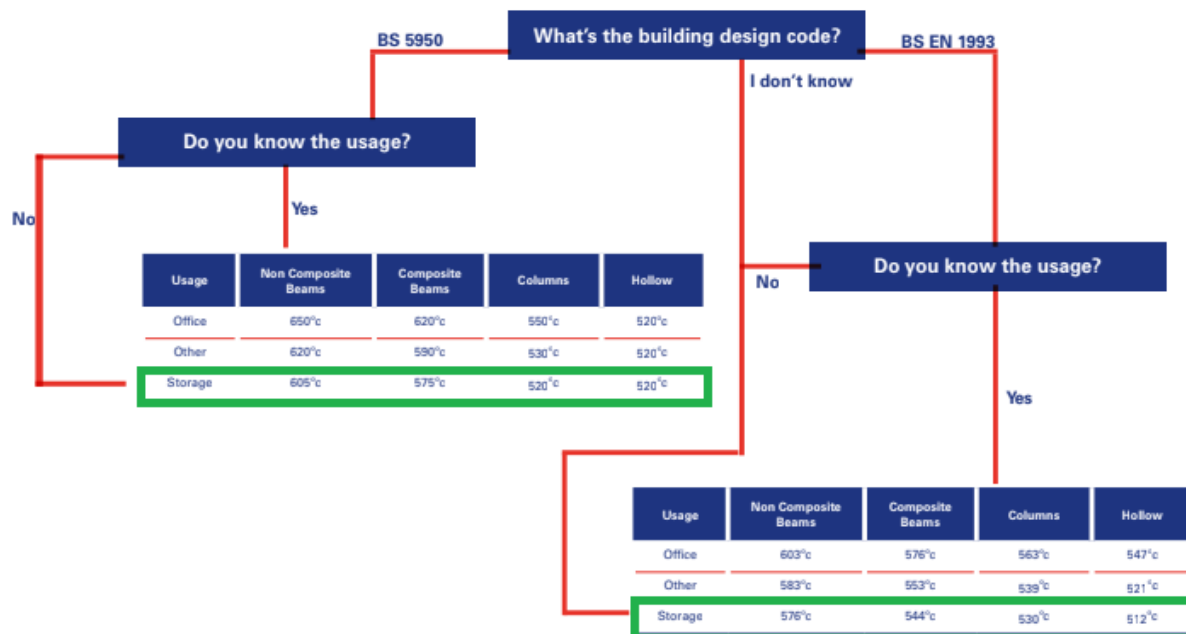
EN13381-6: Concrete Filled Hollow Columns

**Nullifire**  
Smart Protection

Table 5  
Fire Resistance Period: 90 Minutes

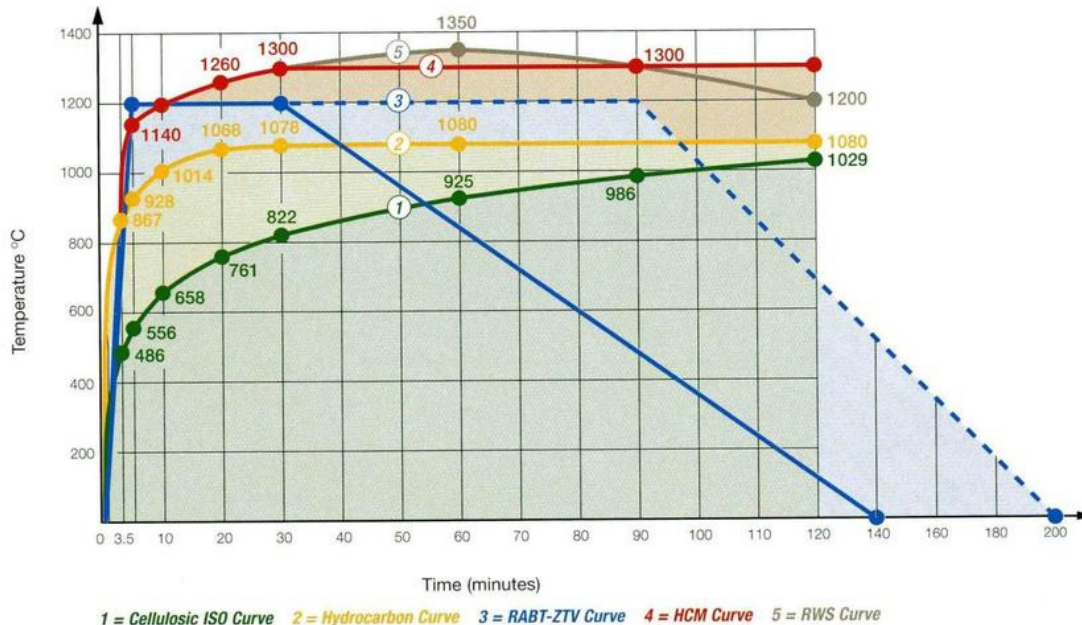
Thickness (mm) Required for a Design Temperature of

Wall Thickness (mm)	350°C	400°C	450°C	500°C	512°C	520°C	521°C	547°C	550°C	600°C	620°C	650°C	700°C	750°C
	DFT (mm)	DFT (mm)	DFT (mm)	DFT (mm)	DFT (mm)	DFT (mm)	DFT (mm)	DFT (mm)	DFT (mm)	DFT (mm)	DFT (mm)	DFT (mm)	DFT (mm)	DFT (mm)
3.2	-	3.902	3.498	3.144	3.063	3.012	3.005	2.841	2.822	2.566	2.498	2.400	2.239	2.045
3.5	-	3.844	3.438	3.080	2.999	2.947	2.940	2.774	2.755	2.496	2.425	2.323	2.152	1.950
4.0	-	3.749	3.337	2.974	2.891	2.839	2.832	2.662	2.643	2.378	2.304	2.194	2.008	1.793
4.5	-	3.653	3.236	2.868	2.784	2.730	2.724	2.550	2.531	2.261	2.183	2.066	1.865	1.635
5.0	-	3.557	3.136	2.762	2.677	2.622	2.615	2.438	2.419	2.143	2.061	1.937	1.721	1.478
5.5	-	3.462	3.035	2.655	2.569	2.514	2.507	2.326	2.307	2.026	1.940	1.809	1.577	1.320
6.0	-	3.366	2.934	2.549	2.462	2.406	2.398	2.215	2.195	1.909	1.819	1.680	1.433	1.163
6.3	3.793	3.308	2.873	2.485	2.397	2.341	2.333	2.148	2.128	1.838	1.746	1.603	1.346	1.068
6.5	3.764	3.280	2.846	2.459	2.371	2.314	2.307	2.121	2.102	1.814	1.724	1.583	1.330	1.055
7.0	3.693	3.209	2.777	2.391	2.304	2.248	2.240	2.056	2.036	1.755	1.667	1.531	1.288	1.024
7.5	3.621	3.139	2.708	2.324	2.237	2.181	2.174	1.990	1.971	1.695	1.611	1.480	1.246	0.992
8.0	3.549	3.068	2.639	2.257	2.170	2.114	2.107	1.925	1.905	1.635	1.555	1.429	1.204	0.961
8.5	3.478	2.997	2.570	2.189	2.103	2.048	2.040	1.859	1.840	1.575	1.498	1.378	1.163	0.929
9.0	3.406	2.927	2.501	2.122	2.036	1.981	1.974	1.794	1.774	1.516	1.442	1.327	1.121	0.897
9.5	3.334	2.856	2.432	2.055	1.969	1.914	1.907	1.728	1.709	1.456	1.385	1.276	1.079	0.866
10.0	3.263	2.786	2.363	1.988	1.903	1.848	1.841	1.663	1.643	1.396	1.329	1.225	1.037	0.834
10.5	3.191	2.715	2.294	1.920	1.836	1.781	1.774	1.597	1.578	1.337	1.273	1.174	0.996	0.803





Note: that while paper/cardboard falls under *cellulosic fire*; plastics fall under *hydro-carbon fires*. The below graph shows that temperature rises more rapidly for hydrocarbon fires. Although at 90 minutes Cellulosic fires reach 986 degC, and hydrocarbon fires reach 1080 degC (i.e. approx 1000 degC); it must be observed that at only 3.5-5.0 minutes the hydrocarbon fire reaches double the temperature of cellulosic:



In conclusion: the paint coat is to provide protection to the steel, such that the critical design temperature is not reached before 90 minutes.

The Cladding (walls and roofing) shall be prefabricated sandwich mineral wool insulation panels certified in accordance to EN13501-1 Class A2, s1, d0 (very little or no contribution to fire, low smoke production and no production of flaming droplets). The jointing, fixing, and weather proofing shall include for all accessories as recommended by manufacturers. The cladding thermal properties shall be selected such that sufficient insulation is provided for typical Malta temperatures and heat as well as cold. Note this is not a habitable space, however it is expected that sufficient shelter and comfort is provided to any Wasteserv personnel carrying out work within the shed.

**Primary steel columns/beams supporting the roof shall be rendered fire resistant using only certified materials and methods to provide a 90-minute fire-rating.**

Contractors must certify the complete shed fire protection systems.

A drainage system shall be designed so as to restrict any spread product leaks and minimize fire and explosion hazards resulting from such spillages.

Electrical Switchgear and control panels for machinery in the new shed shall be IP68 rated.

The new Shed, machinery and tanks (where applicable) shall be provided with grounding facilities for the dispersal and control of static electrical accumulation.

#### (vi) Fire Load

This is the amount of fuel (combustible material) within a particular area which will burn to release heat and feed the fire. At present this is estimated to be approx. 50T of mixture cellulosic (paper source) and hydrocarbon (Plastics source) – i.e. High fire load, fast growth:

Category	Fire growth rate <sup>4)</sup>	Fire growth parameter <sup>5)</sup> kJ/s <sup>3</sup>	Description	Typical examples <sup>6)</sup>
1	Slow	0.003	Evenly distributed low level fire load, small discrete packets of fuel or material of limited combustibility <sup>7)</sup>	Reception areas, concourses (without concession outlets) and halls with limited fire load such as sports stadia and foyers
2	Medium	0.012	Evenly distributed low to mid-level fire load comprising a mix of combustible materials	Offices, lounges, classrooms, auditoria, seating areas, galleries and car parks <sup>8)</sup>
3	Fast	0.047	Stacked combustibles (on or off racking and shelving but excluding high rack storage), some small quantities of materials other than materials of limited combustibility <sup>7)</sup> (or where larger quantities are stored in separate fire-resisting enclosures), process, manufacturing or storage of combustible materials	Shop sales areas <sup>9)</sup> , workshops, factories and small storage buildings
4 <sup>10)</sup>	Ultra-fast	0.188	Medium to large quantities of materials other than materials of limited combustibility <sup>7)</sup> , high racked storage, flammable liquids and gases or where rapid uncontrolled fire growth could occur	Warehousing <sup>11)</sup> , processing plants and car parks <sup>12)</sup> utilizing a car stacker or similar method where there is no fire separation between stacked cars

The materials used for both the structure and the wall cladding are selected so as to present LOW heat release, flame spread, and minimal production of toxic fumes.

NO storage of combustible and flammable materials other than the materials mentioned above will be allowed. Paints, thinners, oils and other potentially combustible/flammable products must be stored in segregated stores and shelving, in limited quantities.

(vii) Fire Detection

An automatic fire detection system Category L1-P1, in compliance to BS 5939 and products to EN54 would provide 24 hours surveillance for any signs of combustion throughout the premises. If the system is properly designed, it would give a very early alarm. This would enable an early emergency response, thus minimizing the cost of fire damage. The detection system FAP shall be linked to existing main FAP within the existing Wasteserv facilities, as well as the CPD via auto-dialer.

There are many kinds of detectors and each is appropriate for specific types of occupancy / category of room.

A properly designed detection system must cover all areas. The system should comprise an addressable series of detectors all linked to a fire alarm panel (FAP) forming various recognizable fire zones. This system should also be coupled with manual call points, alarm bells, external sirens, and other ancillary equipment such as fire/smoke extraction fans.

We suggest either Smoke/heat detectors or beam detector system.

(viii) Fire Suppression Systems

The fire protection of this project is aimed at: *Fire Department Reliance, manual suppression systems, early warning and detection, effective Smoke & Heat extraction systems which maintain low temperatures thus extending the resistance of the structure stability.*

This option is a package of various systems which 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.

It is noted that the site is manned by Security 24/7 (either at the MN site / gate house; or at the AD security room.

The package consists of:

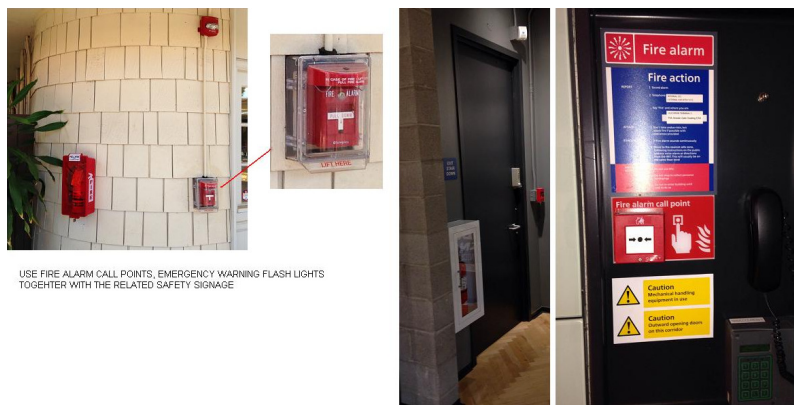
- Multi-sensor detection system / beam detection and IR cameras within the shed, with strategically programmed fire alarm panel and control. The cameras will monitor temperatures on the sorting conveyor and in other interested areas.
- External Hydrant system to BS9990; each hydrant shall be stand pipe type with 2 x 2 ½" landing valve outlets, and shut off isolation valve.
- Fire extinguishers, safety signage, emergency illumination, manual alarm call points.
- Smoke and heat extraction via the adequate natural ventilation openings to be designed and provided within the shed's modified cladding, and ridge venting or Automatic Opening Vents.
- Strict implementation of fire compartmentation: The Structure and cladding shall be designed and constructed to REI-90;
- emergency preparedness and evacuation procedures.
- Hose reel cabinets within the shed, designed to BS5306-1 or EN671.
- Portable water canons (monitors) to fight significant fires. These shall be auto-rotation, fixed angle. The system shall consist of 2 portable monitors and 2 sets of 30m + 30m x 1 ½" fire hose with BS336 couplings to be connected to the fire hydrants.

For the Reception Hall sited over the reservoir at the gate house, ALL of the above will be included, except, the monitors will be fixed, installed at high level within the hall (similar to the system at the MTP reception of MN) These will be actuated manually once an alarm signal is detected. The pipe work shall all connect to a main fire fighting header fed from submersible fire pumps (similar to set up at Sant'Antnin WTP)

RECOMMENDED Additional components to the above:

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

- 6Kg Chemical Dry Powder & Foam - within shed and storage areas
- 5kg CO2 fire extinguishers are also recommended near electrical switchgear, and electronic equipment.
- A fire-man's switch to shut down power to the whole building is also required.



### **WATER STORAGE – RESERVOIRS & FIRE PUMPS (already available) being designed currently**

Reservoir/s for the storage of fire-fighting water must have the minimum following requirements:

- Capacity for wet hydrant: 1500 lit/min x 90 min = 135m<sup>3</sup> round off to 150 m<sup>3</sup>. the furthest hydrant at the AD must be supplied with 8.5Bar pressure.
- Capacity for Monitors shall be 3000lit/min (at 7 Bar) x 2 monitors x 90 min: 540 m<sup>3</sup>
- ~~Note: reservoir is 17,000m<sup>3</sup> therefore more than adequate.~~ WSM has confirmed that the reservoir underneath the Ad Shed holds this volume.
- Hydrant ring main shall be 6" (DN150mm) branching into 4" radial branch outs. All hydrants shall be preceded by an isolation valve. Outlets for fire brigade at street level with BS336 couplings. The pump system shall include a CPD Fire INLET for the eventuality of fire pump fault or no water in reservoir.
- The access (for CPD) to the Fire pump room shall be clearly sign posted and in a protected route / external access more than 6m away from shed, as being designed.
- Fire pumps to be to European Standards, ~~twin submersible~~ surface-installed, centrifugal end suction, complete with priming arrangement sized to handle the total flow rate of (1500 + 3000 + 3000) lit/min : total 8000 lit/min consisting of 3 (2-duty, 1-standby) pumps of 4000 lit/min each. Contractor to calculate pressure drop required. Note the Monitors at the AD plant require a 7 bar inlet pressure; the Hydrants require a 8.0-8.5 Pressure.

The pumps must have dual supply: 1 Enemalta power supply, 2 Generator, or alternatively a diesel driven pump.

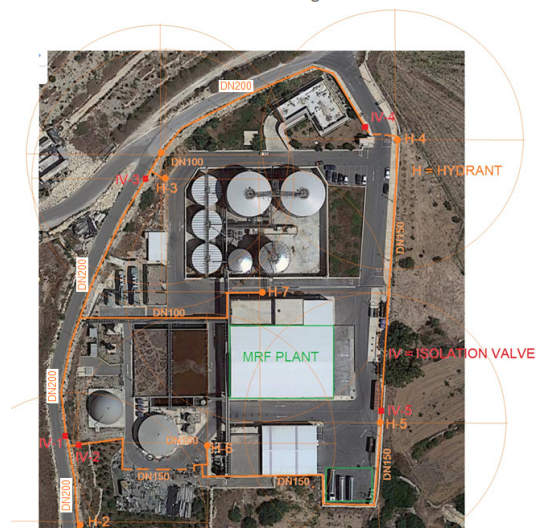
Hydrant Siting information below taken from BS9990:

## 5.2 Provision and siting

**5.2.1** When they are considered to be necessary, private fire hydrants should be provided within the confines of the site after consultation with the local water undertaker and the local fire authorities and rescue service. Their installation should conform to BS 5268 in accordance generally to with this British Standard and also to with any specific requirements of these authorities or the insurance company.

**5.2.2** Fire hydrants should be positioned in such a way that the parking, loading and unloading of vehicles is unlikely to obstruct them, and in choosing locations for them regard should be paid to, the availability of statutory hydrants in public thoroughfares nearby should be taken into account.

**5.2.3** Where fire hydrants are to be installed, they should be included as part of a ring fire main system (see 6.7.6.6) and be positioned not more than 90 m from an entry to any building on the site and not more than 90 m apart. They should preferably be sited immediately adjacent to roadways or hard-standing facilities suitable for fire and rescue service appliances. To ensure that they remain usable during a fire, they should be sited with consideration to take into account the effect that falling debris and other possible occurrences during a fire might have on the continuing viability of the location, and should be not less than 6 m from the building or other risk.





(ix) Safety Signs and Emergency Illumination

Emergency lighting & Signage shall be in accordance with EN1838 or BS5266

The use of safety signage is of utmost importance. These will allow and facilitate a quicker exit time. The signage shall include 'Exit directional Arrow & Running Man symbol' signage in the form of photo-luminescent plaques installed at high level (not more than 2.4m) above emergency exit doors, or in the path towards an exit. Preferably, and where possible, these should also be incorporated with emergency luminaries. All areas must include adequate lighting and emergency routes must have a minimum of 75-100 lux, and Emergency (battery-back-up) lighting of minimum 5 lux.

Such illumination shall be continuous during the time that the conditions of occupancy require that these routes/areas be available for use. Artificial lighting is therefore considered as being necessary.

Any energy-saving sensors, switches, timers or controllers are to be of the approved type and under no circumstances must they compromise the continuity of illumination in the designed exit routes/areas. The illumination source must be reliable.

(x) Access and Facilities for Fire Service

The site is accessed within a reasonably short time from both the Floriana/Kordin and the Xemxija Fire stations; but the wet hydrant system will speed up fire-fighting operations.

There shall be direct CPD fire engine/bowser fill up inlet breeching.

(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. Personnel must also be made aware of fire evacuation plans.

#### 4. VENTILATION

The Proposed Shed will have totally enclosed **insulated panelling** sides and includes a **de-dusting system** so as to reduce Odour, dust and noise pollution and also maintain a suitable thermal working environment. Therefore, mechanical ventilation will be required, and filtered fresh air, and stale air exhaust systems will need to be installed. The following CIBSE Guidelines should be applied:

# CIBSE GUIDELINES

Environmental design

because the thermal steady state is not normally reached. It is often convenient for their resultant temperatures to be similar to those of adjoining spaces.

The summer comfort temperatures given in Table 1.5 apply to air conditioned buildings. Higher temperatures may be acceptable if full air conditioning is not present, and guidance on this may be found in section 1.4.2, with a detailed discussion of the adaptive approach in section 1.6.

The Fuel and Electricity (Heating) (Control) Order 1974<sup>20</sup> and the Fuel and Electricity (Heating) (Control)

(Amendment) Order 1980<sup>21</sup> prohibit the use of fuels or electricity to heat premises above 19 °C. This does not mean that the temperature in buildings must be kept below 19 °C but only that fuel or electricity must not be used to raise the temperature above this level. In Table 1.5, for some applications, the recommended winter design temperatures exceed 19 °C. In these cases, it is assumed that the recommended temperatures can be maintained by contributions from heat sources other than the heating system. These may include solar radiation, heat gains from lighting, equipment and machinery and heat gains from the occupants themselves.

VENTILATION  
LIGHT  
NOISE

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 for stated activity and clothing levels*			Suggested air supply rate (L.s <sup>-1</sup> per person) unless stated otherwise	Filtration grade‡	Minimum illuminance‡ (lux)	Noise ratings§ (dba)
	Temp. /°C	Activity /met	Clothing /clo	Temp. /°C	Activity /met	Clothing /clo				
Factories:										
— heavy work	11–14 <sup>[1]</sup>	2.5	0.85	— <sup>[2]</sup>	—	—	— <sup>[3]</sup>	Depends on use	— <sup>[4,5]</sup>	50–65
— light work	16–19	1.8	0.85	— <sup>[2]</sup>	—	—	— <sup>[3]</sup>	Depends on use	— <sup>[4,5]</sup>	45–55
— sedentary work	19–21	1.4	1.0	21–23	1.4	0.65	— <sup>[2]</sup>	Depends on use	— <sup>[4,5]</sup>	45

[13] As required for industrial process, if any, otherwise based on occupants' requirements

Recommended fresh air is 2-4 ACH (air changes/hour). We suggest having fresh air intake louvers, with screens and high-level extraction fans with silencers and active carbon filters. These fans may be 2-speed fans sized for 2 ACH at speed 1 (timer based, normal work hours); 4 ACH at speed 2 (thermostatically switched, during high temperature times of day or season); Smoke venting is done naturally via the smoke vents. Therefore, the mechanical extraction system must be interfaced to switch OFF in the event of a fire.

Ideally, such systems should be configured for environmental/temperature control and smoke exhaust mode.

## 5. LIGHTING

We have reviewed the design of the workshop shed, including its elevation and polycarbonate fenestration, etc., and based on the drawings we have verified the following:

- That there will be sufficient artificial light fittings to provide day-light minimum lux levels.
- That the illuminance is well distributed providing very low glare and optimal contrast
- That the window areas, positions and orientation is adequate in order to encourage use of daylight and reduce fuel/energy consumption.
- That window areas are not excessive, causing unnecessary overheating & glare (in summer), heat loss (in winter).
- That the glass type (U-value) and tint should be selected such that adequate luminance irradiation is achieved

Typical illuminance values, obtained from **CIBSE SLL Lighting Guide 10 lighting for the built environment; Guide 12 Emergency lighting & EN 12464-1:**

Emergency Lighting	:	1-2 Lx
Corridors, passageways, under conveyor belts stairs	:	200 Lx
Store rooms	:	150 Lx
General / workshop	:	400-500 Lx
Detailed work areas, sorting	:	500 Lx

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.*

**Natural light** (available during day time, average sunny day) in this project is not adequate or sufficient and generally does not respect a 1:10/1:12 (glazing area: floor area). However, given the fact that this is an industrial site, and requires enclosure, artificial day-lighting is best suited for the intended use.

Battery back up 3 hrs for all emergency lights, and/or an 'essential' power supply via a 6-8hr generator shall be guaranteed.

Cont'd next page.../

## Conclusion

The contents of this report assume that the data provided by Wasteserv is accurate and complete. Any changes to the information provided shall require a revision of this report or confirmation of its validity, as applicable.

Provided the above recommendations are installed and applied, then, we confirm that the premises will be adequately illuminated and ventilated for the intended use, and fire safety in accordance to the European standards.

This report does not constitute a compliance certificate. The installation shall require certification following commissioning.



**Ing. Fabio Stivala      Warrant 473**

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Building Services & Fire Consultant  
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