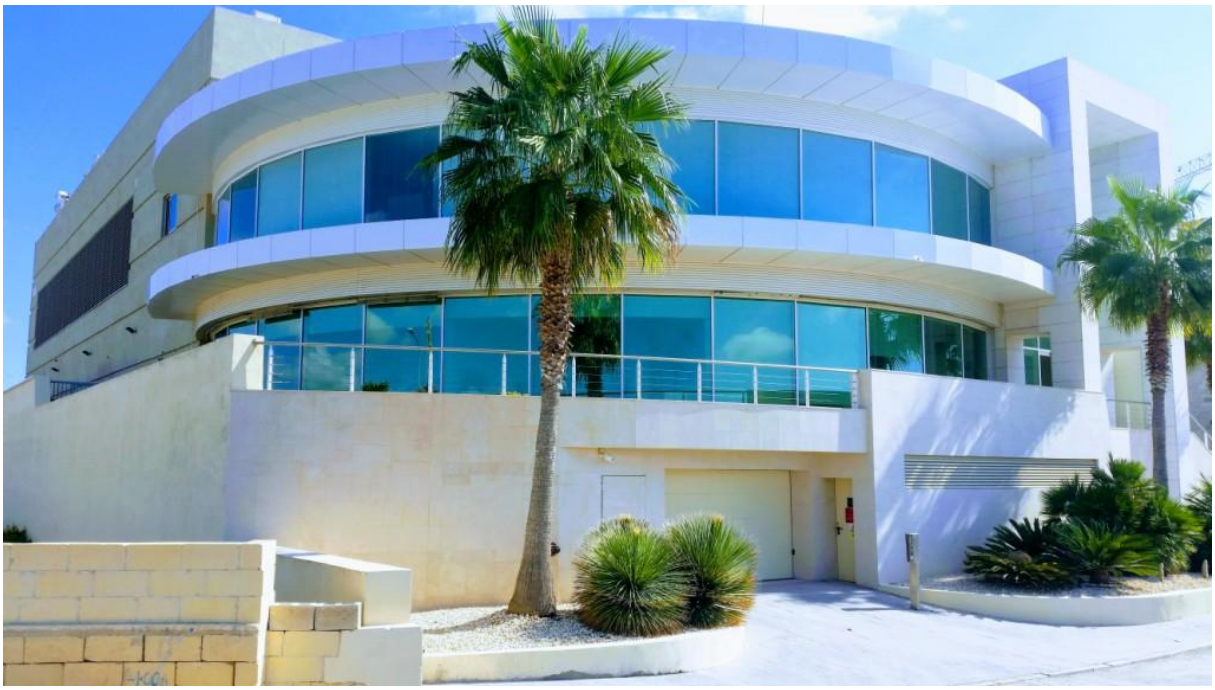
IP 0001/19

STERLING CHEMICAL MALTA LTD, HAL FAR

APPLICATION FOR VARIATION AND RENEWAL OF IPPC PERMIT
VOLUME 2: IPPC APPLICATION DOCUMENT



Version 2: June 2019

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Quality Assurance

Sterling Chemical Malta Ltd, Hal Far
Application for Variation and Renewal of IPPC Permit: Volume 2
June 2019

Report for: Sterling Chemical Malta Ltd

Revision Schedule

Rev	Date	Details	Prepared by	Reviewed by	Approved by
00	Mar. 2019	Submission to client	**Rachel Decelis** Senior Consultant	**Rachel Xuereb** Director	**Adrian Mallia** Managing Director
01	June 2019	Consolidated application	**Rachel Decelis** Senior Consultant	**Rachel Xuereb** Director	**Adrian Mallia** Managing Director

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1. INTRODUCTION

1.1. This application for variation and renewal of the Integrated Pollution Prevention and Control (IPPC) permit was commissioned by Sterling Chemical Malta Ltd, herein referred to as 'the Operator'.

1.2. Sterling Chemical Malta Ltd currently operates a factory for the development, optimisation and manufacture of Active Pharmaceutical Ingredients (APIs) at HF 50 and HF 51, Hal Far Industrial Estate. Currently more than 90% of the company's turnover is generated by oncology products.

1.3. The operation of the facility is regulated by IPPC permit number IP 0001/14/B issued by the Environment and Resources Authority (ERA). The area currently authorised by the IPPC permit is shown in **Figure 1.1**.

1.4. The Operator plans to expand the API development and production activity in Malta in the same therapeutic field as the existing plant (i.e. primarily oncology drugs). The expansion plan will be in two phases: a research and development (R&D) / pilot phase (phase 1) and an industrialisation / commercialisation phase (phase 2). The planned expansion is the subject of an Environmental Impact Assessment (EIA) Update, covering both phase 1 and phase 2. Phase 1 is the subject of the current IPPC variation application, and is herein referred to as the 'Scheme'.

1.5. Phase 1 consists of research activities with the aim of developing innovative synthetic processes for the preparation of novel APIs for the company. Research activities have already started in the Operator's existing laboratories, and preliminary data on the first products is already available.

1.6. Phase 1 will therefore include commissioning of a new R&D scale-up line in the adjacent HF 53 block. Construction of this block is permitted by DN 1094/18, and the building is currently under construction. However, only one production line (line 7) will be used as part of Phase 1.

1.7. This R&D line will ensure a high-quality standard preparation of 1-2 kg of product per batch, in order for the Operator to perform stability studies, generate data for pharmaceutical documentation (Drug Master File) and to present a complete technical package to the Operator's potential future customers.

1.8. It is planned that Phase 1 will be operational in the third quarter of 2019.

1.9. Phase 2 will include commissioning of reactors in the remaining four new lines in the HF 53 block, and expanded facilities for waste management in the HF 50 block. Phase 2 will be the subject of a separate IPPC variation application. Following the required authorisations, manufacturing of the novel products to be developed is expected to commence starting from 2020 and commercialised in

2022 – 2024 after the Operator's customers have completed all the required Finished Dosage Form activities.

Structure of the IPPC Application

1.10. The IPPC Application consists of four volumes:

- **Volume 1** comprises the IPPC application forms A and C;
- **Volume 2** (the current volume) consists of the IPPC application document;
- **Volume 3** consists of an Addendum to the original Land and Groundwater Risk Assessment prepared in 2015[1]; this Addendum covers the risks to land and groundwater from the Scheme; and
- **Volume 4** consists of the response to the feedback from ERA and regulatory consultees on the IPPC application.

[1] En-Sure Ltd, 2015. *Sterling Chemical Malta Ltd, Hal Far: Land and Groundwater Risk Assessment* (Version 1). San Ġwann, December 2015; iv + 41 pp. + 3 Appendices.

Figure 1.1: Location of the Scheme

en-sure monitoring

Location of Scheme site

Legend

Existing site boundary

Proposed site extension

IP 0001/14/A

IPPC application

Map by: en-sure monitoring

Client: Sterling Chemical Malta Ltd	Ref: ES_STG004
File ref: IPPC\Sterling\Maps	Date: 3 / 2019

INDICATIVE ONLY - Not to be used for direct interpretation

2. THE SCHEME

C1.2 Non-Technical Description

2.1. ERA's Terms of Reference (ToR) are:

> *Please provide a non-technical summary of the proposed changes.*

2.2. Sterling Chemical Malta Ltd currently operates a factory for the development, optimisation and manufacture of Active Pharmaceutical Ingredients (APIs).

2.3. The factory will be expanded in two phases. This IPPC application is for Phase 1 of the expansion, herein referred to as 'the Scheme'.

2.4. The Scheme comprises a research and development (R&D) / pilot line for anti-cancer drugs, together with associated utilities, laboratories and other facilities. Sterling Chemical is already permitted to produce anti-cancer drugs.

2.5. This R&D / pilot line will be part of a new building located to the east of the existing block.

2.6. The production processes at the Scheme will be similar to the existing ones, using the same types of raw materials and generating the same types of wastes. However, the scale will be very small scale, with four reactors sized 50 to 150 L each in this production line.

2.7. Emissions to air will be mitigated using similar abatement systems as the existing plant, and a new scrubber will also be installed to reduce emissions to air.

2.8. Wastes will be managed in the same way as existing waste streams, and a new impermeable reservoir will be added to collect any spills and wash water from the R&D / pilot line.

2.9. A land and groundwater risk assessment prepared for the Scheme (**Volume 3**) has concluded that as a result of the mitigation measures envisaged to be implemented, notably containment and abatement systems, risks to land and groundwater from the Scheme range from none to very low and low.

2.10. Monitoring of air emissions and noise will be carried out as part of the operation of the Scheme.

C1.3 The Proposed Variations

2.11. ERA's ToR are:

> *Please provide a summary of the variations which you are applying for.*

This should include:

- *a description of the change in operation requiring the variation;*
- *an indication of the variations to the conditions of the permit that you wish to apply for.*

2.12. The proposed variations comprise:

- An R&D pilot plant (line 7 of the new production block in HF 53), and associated utilities;
- Laboratories and other associated activities (including a maintenance workshop); and
- Changing rooms, toilets, offices and parking.

2.13. The suggested variations to the IPPC permit are summarised in **Table 2.1**.

Table 2.1: Proposed variations to IPPC permit conditions

Reference (IP 0001/14/B)	Subject	Variation requested
Covering page	Site address	To include HF 53 block
Table 1.1.1	Associated activities	Addition of four reactors
Table 1.4.1	Improvement programme	Ref. 10: Extension of noise monitoring deadline to include the Scheme in the monitoring study Ref. 12: Inclusion of new fume hood exhaust vents (EM16-20) in the one-time monitoring required Ref. 15: Inclusion of new wash water reservoir when monitoring explosion risk
Table 2.2.1	Emission points to air	Addition of new emission points to air (EM13-20)
Table 2.2.2	Emission limits to air	Addition of new scrubber
2.2.1.13 – 2.2.1.18	Emissions from scrubber	Requirements to apply to new scrubber too
Table 2.2.3	Emission point to sewer	Addition of new sewer discharge point (EM21)
Schedule 2, S2.4.1	Emissions to air	Addition of new scrubber
Schedule 3A	Site plan	Extension to include HF 53 block
Schedule 3B	Effluent and air emission points	Addition of new emission points to air and sewer discharge point

C1.4 Site Maps and Reports

2.14. The IPPC application form requires the submission of the following information when a change in operation that would result in additional land being included within the site of the installation is proposed:

C.1.4.1: A site report, describing the condition of the site of that part of the installation in respect of which you are applying for a

variation, and, in particular, identifying any substance in, on or under the land which may constitute a pollution risk. A baseline report assessing the state of the groundwater and land may also be required by the Authority.

C1.4.2: A suitable map (or maps) showing the location of the site of the installation, and the area for which a variation of the IPPC permit is being applied for. The outline of the site and the area requiring the variation should be clearly marked in colour, and the surroundings of the site should be included in the map.

C1.4.3: Suitable block plans, properly labelled, showing any changes to the location and nature of the various activities being proposed on that site.

2.15. A Land and Groundwater Risk Assessment had been prepared for the facility in 2015[2], to cover the activities permitted at the time, with an Addendum prepared in 2018[3] to cover proposed new activities that have since been permitted.

2.16. An Addendum to that Assessment, covering the proposed variations addressed by this IPPC application, is included as **Volume 3** of this IPPC application.

[2] En-Sure Ltd, 2015. *Sterling Chemical Malta Ltd, Ħal Far: Land and Groundwater Risk Assessment* (Version 1). San Ġwann, December 2015; iv + 41 pp. + 3 Appendices.
[3] En-Sure Ltd, 2018. *Sterling Chemical Malta Ltd, Ħal Far. Application for Variation of IPPC Permit: Volume 3: Addendum 1 to Land and Groundwater Risk Assessment* (Version: 2). San Gwann, August 2018; vi + 28 pp. + 1 Appendix.

3. TECHNIQUES

C2.1 Environmental Management System

3.1. ERA requires the Applicant to:

> *Provide details of any changes to environmental management techniques resulting from your proposals.*

3.2. The Operator already has several Environmental Management System (EMS) procedures and documents in place; a copy of the relevant documentation has previously been submitted to ERA.

3.3. Sterling Chemical aims to apply for certification to the new ISO 14001:2015 standard, and already has an implementation programme for this in place. It is envisaged that ISO 14001 certification will be in place in 2019. A copy of the ISO 14001 certificate, as well as any other information required, will be forwarded to ERA once the certification process is completed.

3.4. The activities covered by this variation application will be included in the EMS once they are fully commissioned. A copy of the final updated EMS documents can also be submitted to ERA if required.

C2.2 Proposed Activities

3.5. ERA's ToR require the Applicant to:

> *C2.2.1 Describe any proposed changes to the installation activities.*
>
> *C2.2.2 Describe the proposed techniques and measures to prevent and reduce waste and emissions of substances and heat (including during periods of start-up or shut-down, momentary stoppage, leak or malfunction) as a result of your proposals.*
>
> *C2.2.3 Submit a flow diagram summarising the proposed installation activities and indicating the changes.*
>
> *C3.11 By means of a mass flow diagram, summarise the emissions and waste described in sections C3.1, C3.2, C3.3, C3.4, C3.6, and C3.8 of this application.*

3.6. As noted, the Scheme comprises the operation of the following activities in block HF 53; this block is located to the east of the existing plant:

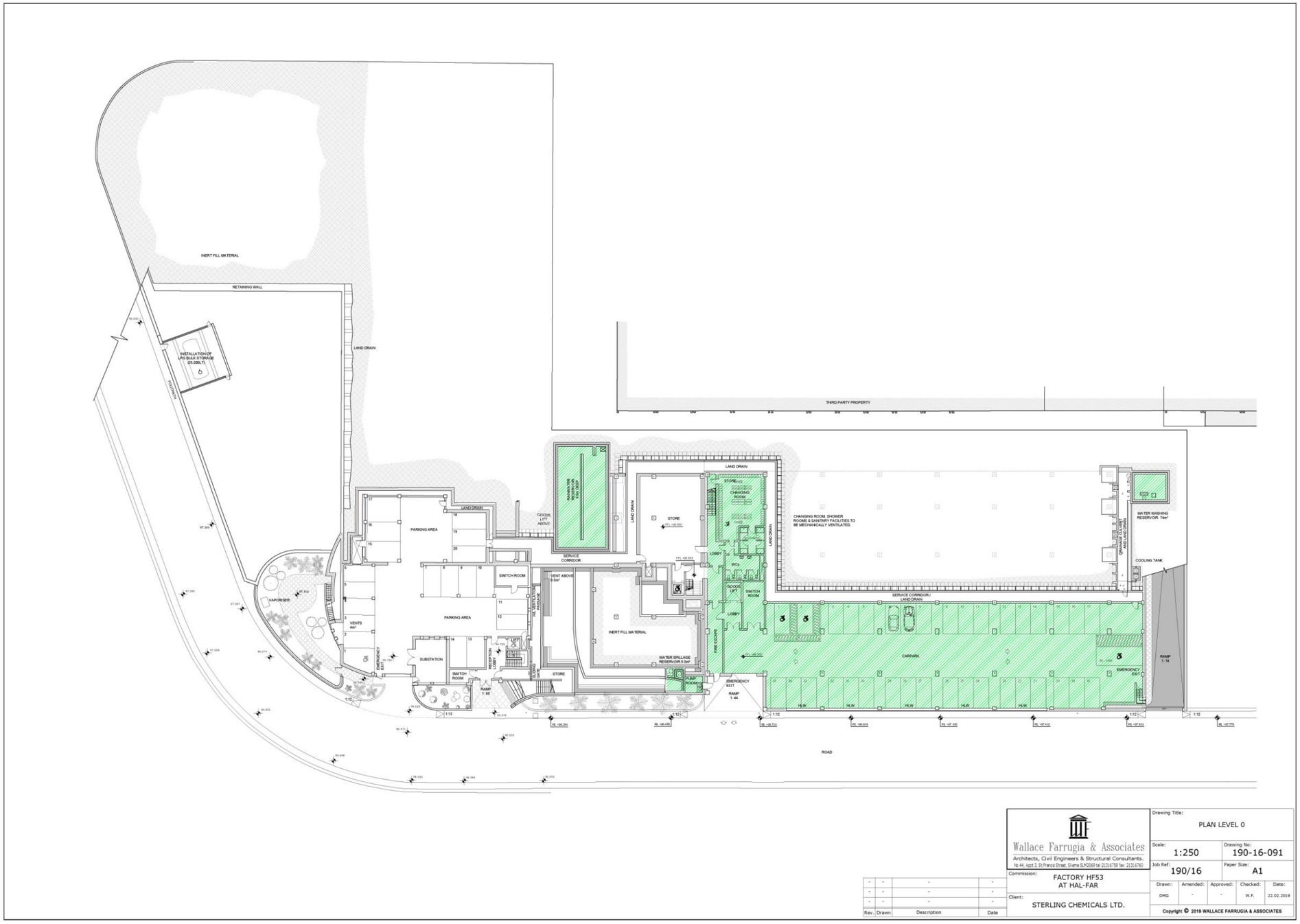
- An R&D pilot plant (line 7 of the new production block), and associated utilities;

- Laboratories and other associated activities (including a maintenance workshop); and
- Changing rooms, toilets, offices and parking.

3.7. The layout of the facility is shown in **Figure 3.1** to **Figure 3.6**; the areas that will become operational as part of the Scheme are shaded in green. A high-resolution version of all the drawings presented in this application is provided in **Annex 1**.

3.8. The following sub-sections describe the technical activities associated with the above variations in further detail.

Figure 3.1: Scheme layout (Level 0)



Wallace Farrugia & Associates
Architects, Civil Engineers & Structural Consultants
No 44, Apt 3, St Frecs Street, Sliema SLM2069 tel: 2131758 fax: 2131760

Commission: FACTORY HF53 AT HAL-FAR

Client: STERLING CHEMICALS LTD.

Drawing Title: PLAN LEVEL 0

Scale: 1:250 | Drawing No: 190-16-091

Job Ref: 190/16 | Paper Size: A1

Drawn:	Amended:	Approved:	Checked:	Date:
DMG	-	-	W.F.	22.02.2019

Rev.	Drawn	Description	Date
-	-	-	-
-	-	-	-
-	-	-	-

Figure 3.2: Scheme layout (Level 1)

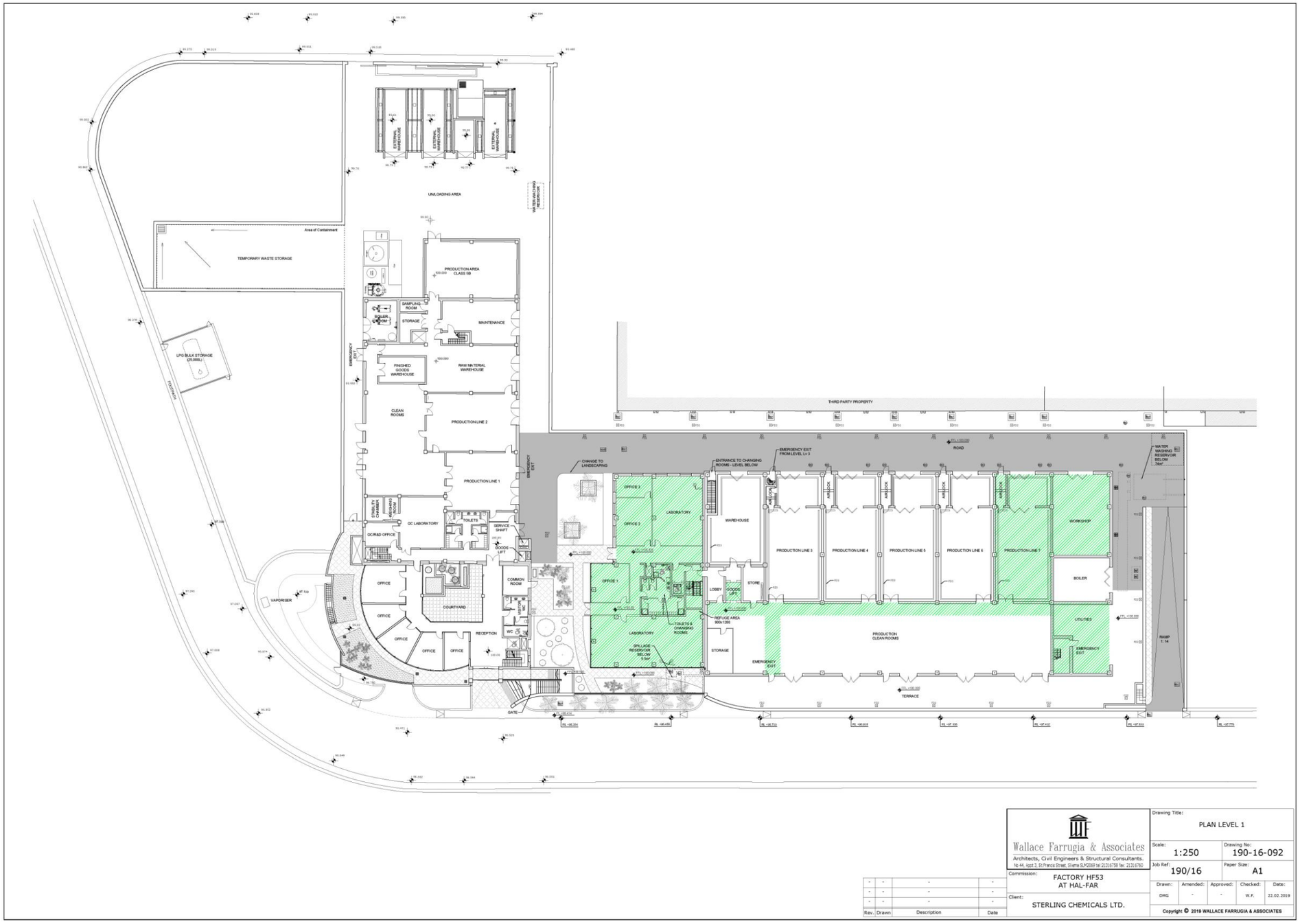
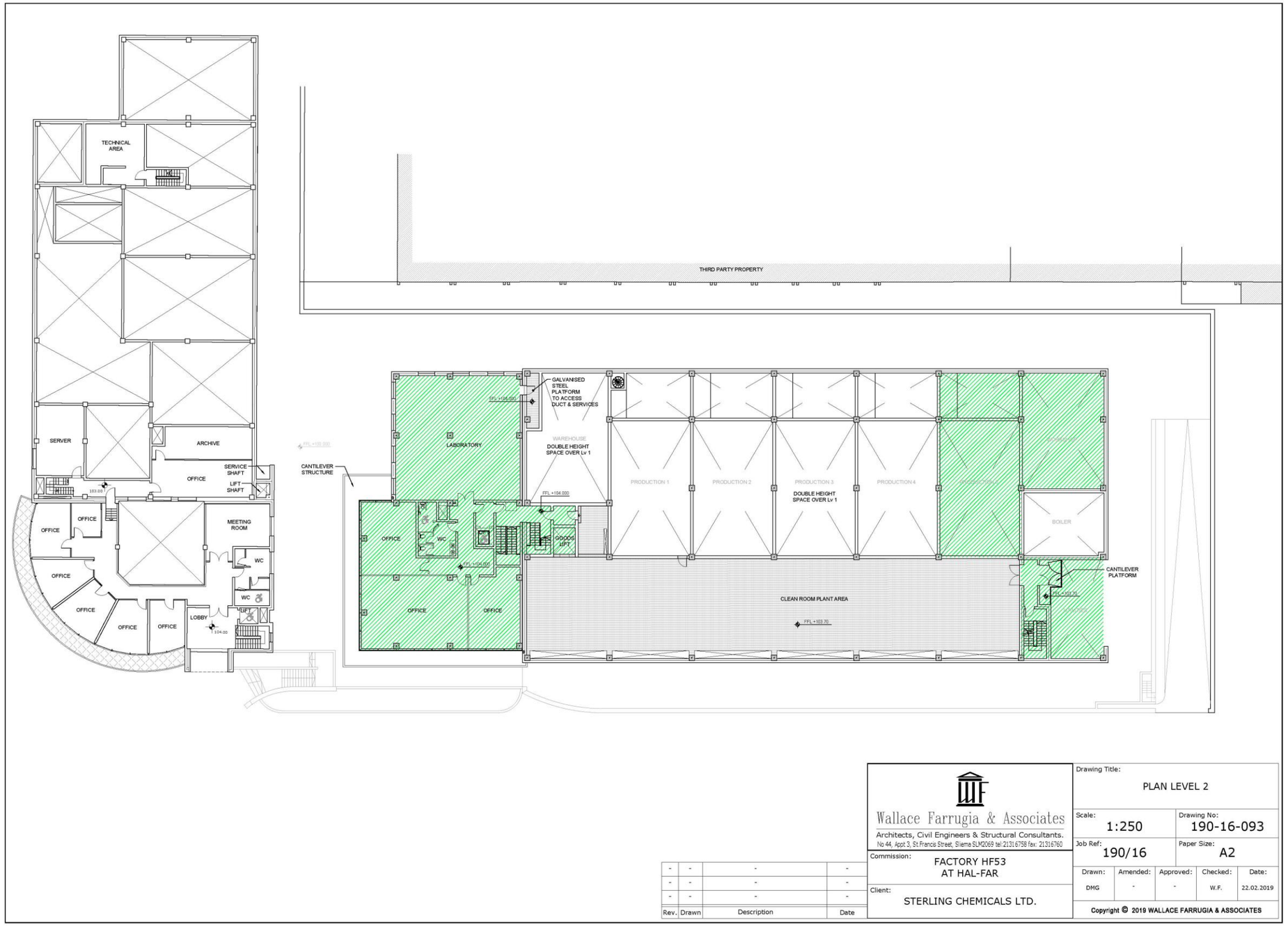


Figure 3.3: Scheme layout (Level 2)



Rev.	Drawn	Description	Date
-	-	-	-
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-	-	-	-

Wallace Farrugia & Associates
Architects, Civil Engineers & Structural Consultants.
No 44, Appt 3, St Francis Street, Sliema SLM2069 tel:21316758 fax: 21316760

Commission: FACTORY HF53 AT HAL-FAR

Client: STERLING CHEMICALS LTD.

Drawing Title: PLAN LEVEL 2

Scale:	Drawing No:
1:250	190-16-093
Job Ref: 190/16	Paper Size: A2

Drawn:	Amended:	Approved:	Checked:	Date:
DMG	-	-	W.F.	22.02.2019

Figure 3.4: Scheme layout (Level 3)

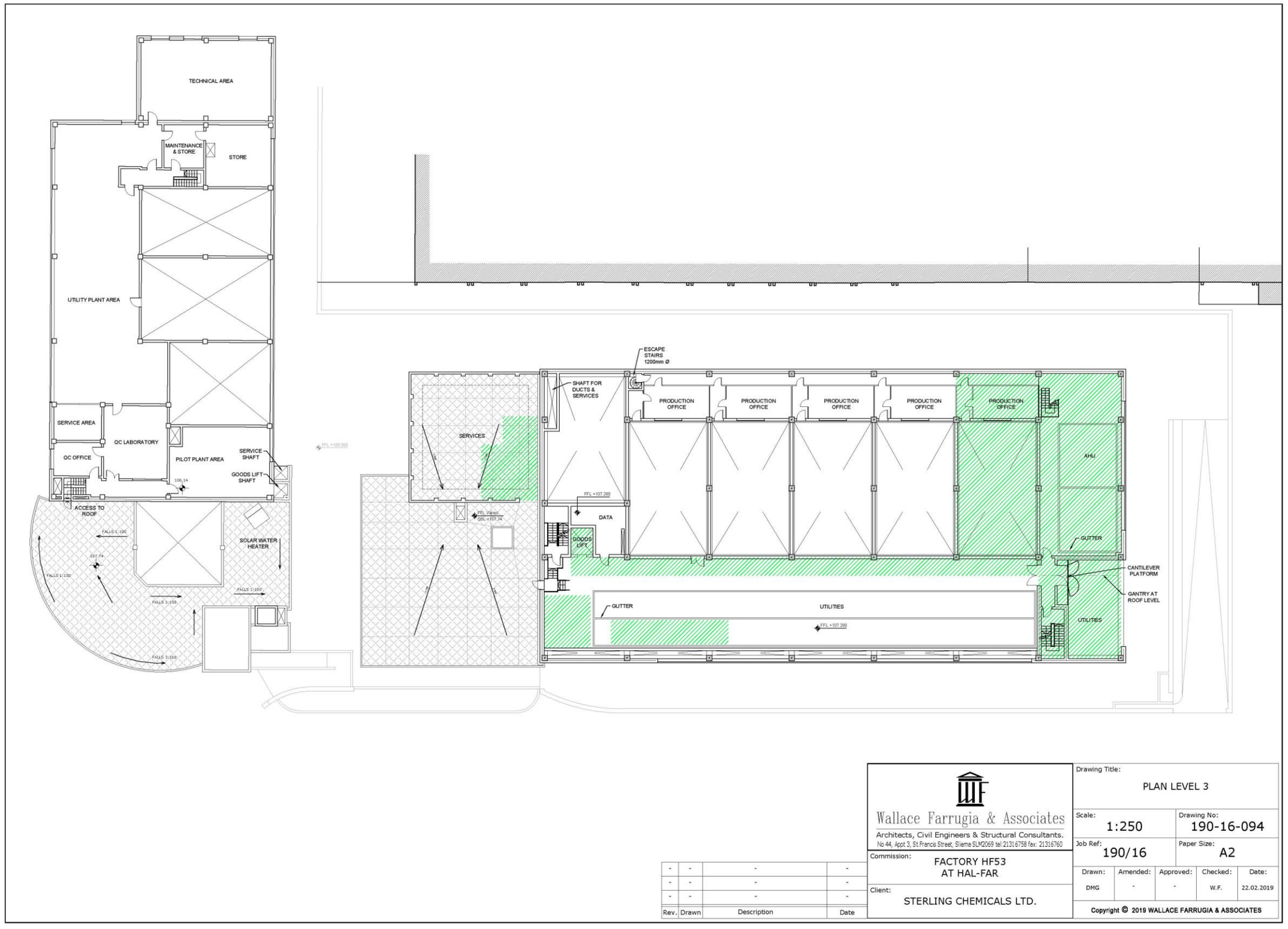


Figure 3.5: Scheme layout (Level 3 Intermediate)

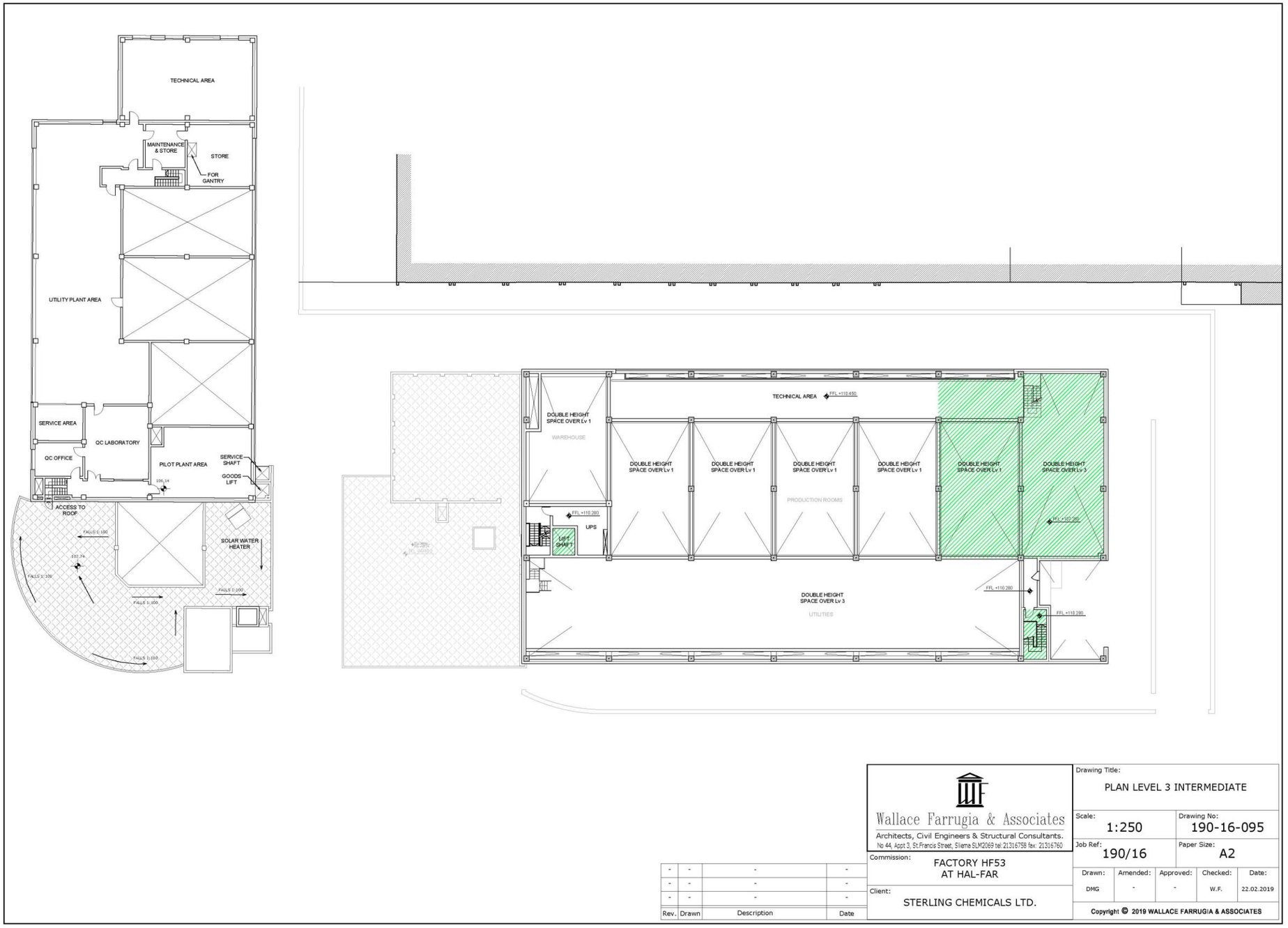
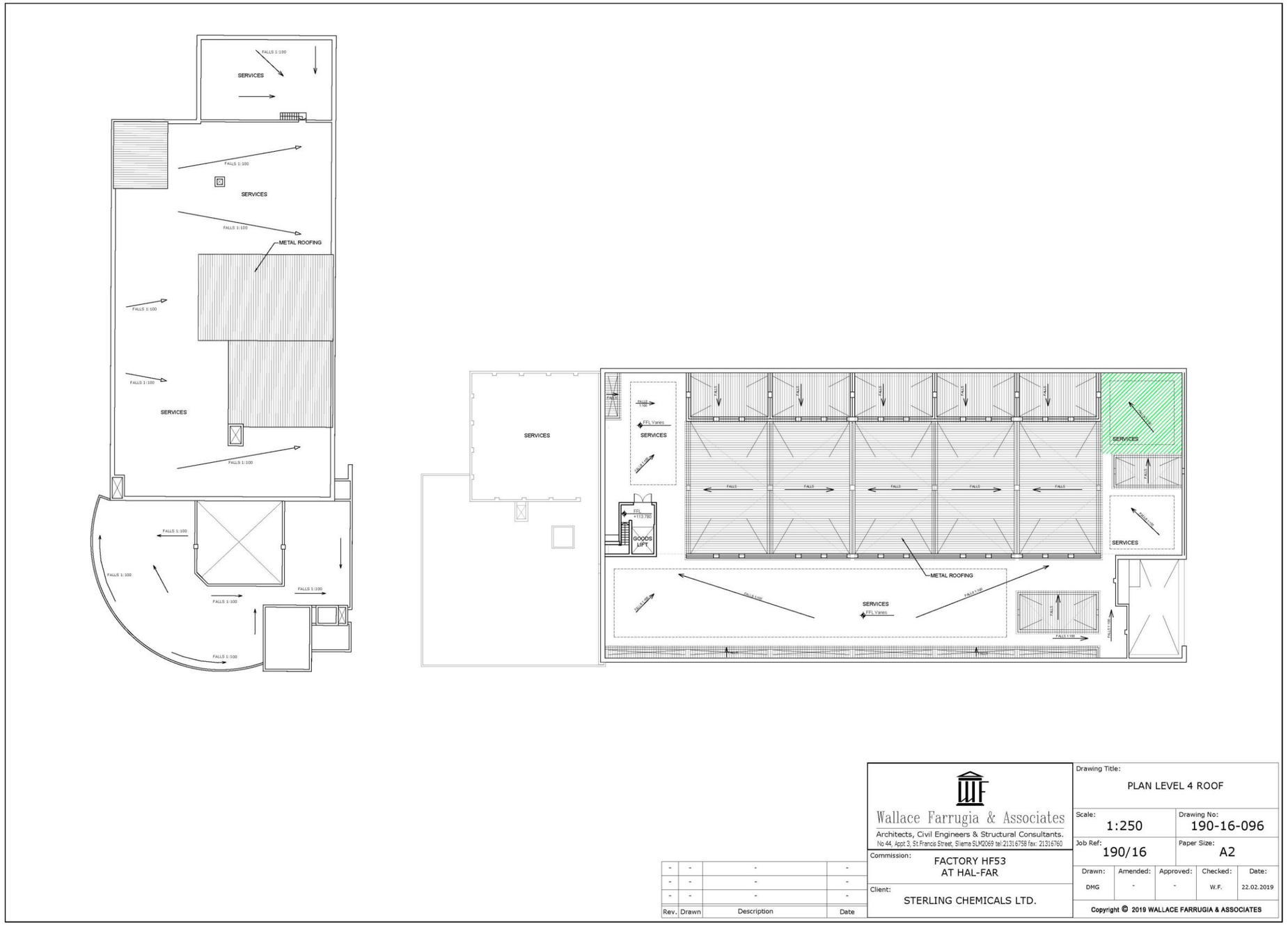


Figure 3.6: Scheme layout (roof level)



R&D Pilot Plant

3.9. A new R&D pilot plant will be commissioned in line 7 of the HF 53 production block. The pilot plant will be used for R&D / scale-up of novel drugs for the company.

3.10. It is envisaged that the pilot plant will primarily be used for R&D / scale-up of oncology (anti-cancer) drugs. It is noted that the current IPPC permit already allows the Operator to manufacture oncology drugs.

3.11. Four small-scale reactors (**Figure 3.7**), with sizes ranging from 50 to 150 L will be in place. Batch sizes will be of approximately 1-3 kg per batch.

Figure 3.7: Reactors

3.12. A new clean room will also be in place for further processing and finishing of the product, which will include the following equipment:

- A 50 L vertical R&D-scale centrifuge (**Figure 3.8**);
- An R&D-scale steel or glass filter, with a capacity for 25 L of slurry (**Figure 3.9**); and
- A R&D-scale (lab) dryer (**Figure 3.10**).

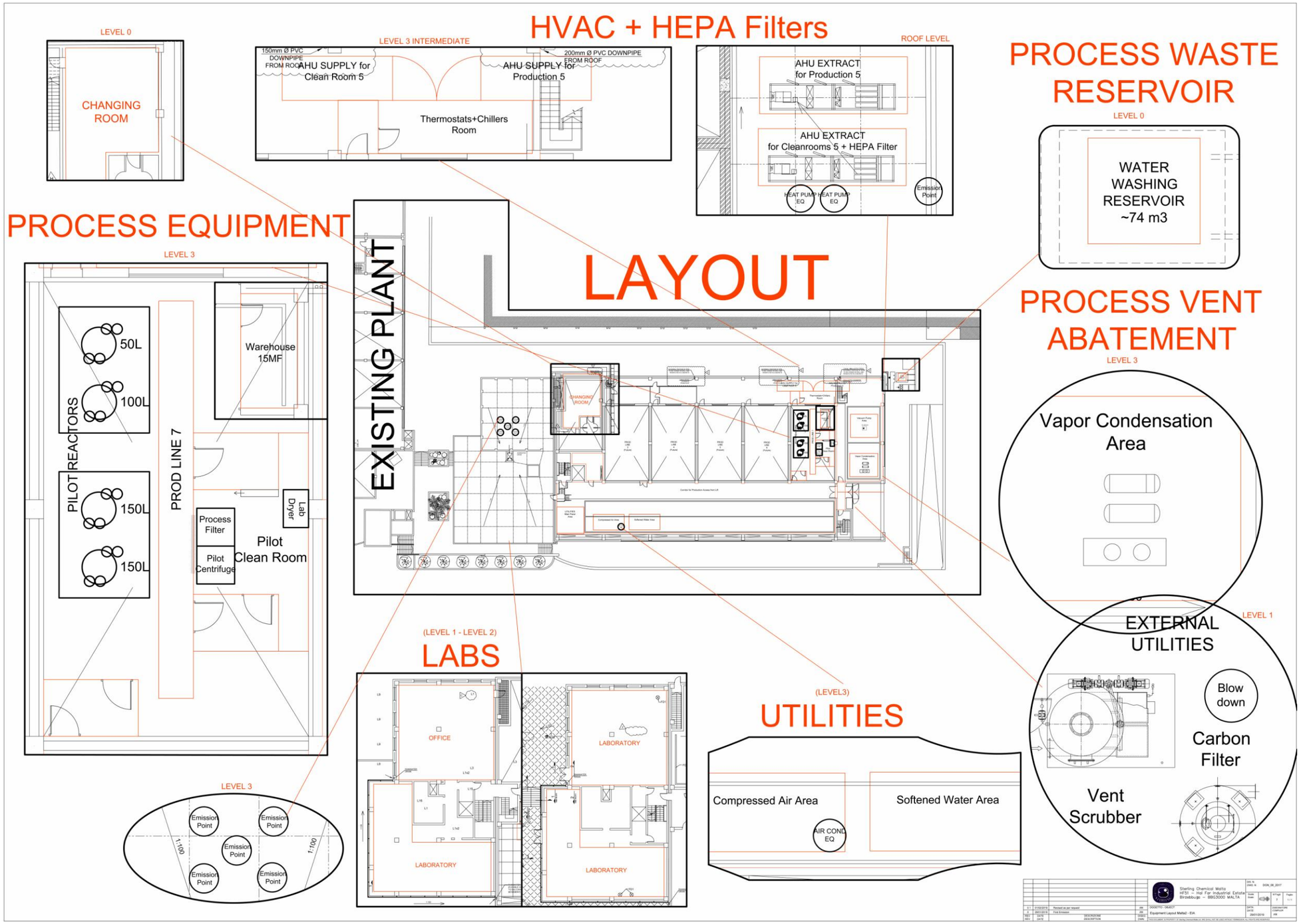
Figure 3.8: Centrifuge

Figure 3.9: Filter

Figure 3.10: Dryer

3.13. The layout of the pilot line will be as shown in **Figure 3.11**. This Figure also shows the location of key associated activities / utilities that will also be commissioned.

Figure 3.11: Pilot plant layout



3.14. The finished product from the pilot line will be stored in the existing finished goods warehouse, or in the new pilot plant warehouse (included as part of line 7).

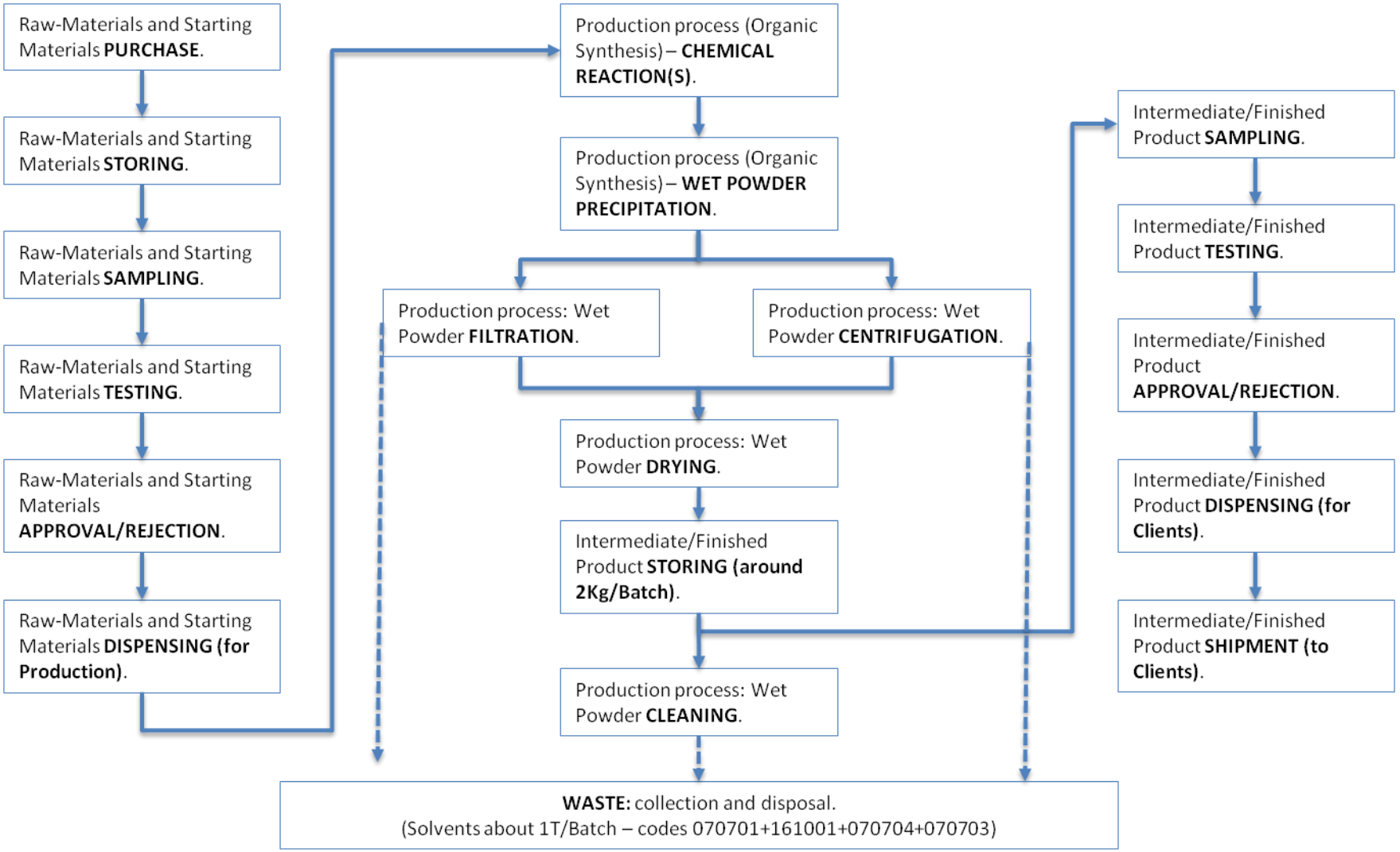
3.15. The new production facilities will follow processes similar to those already authorised and operational in the HF 51 site. A generalised process flow chart is included in **Figure 3.12**.

3.16. As required by condition 1.6.1 of the permit, ERA will be notified prior to the production of any new APIs. The applicable information (including safety data sheets, an emission diagram, and a mass flow calculation when required) will be provided prior to the start of industrial-scale production.

3.17. Emissions to air will be treated as described in section C3.6.

3.18. After production, the reactors will be cleaned as per the current practice. The cleaning material (organic solvent / water) will be collected in IBCs and managed with the current waste streams.

Figure 3.12: Process flow chart



Associated Activities

3.19. New laboratories will be installed on Level 1 and Level 2 of the HF 53 block. These will be used for testing related to the pilot plant, and eventually for the rest of the new production lines in the HF 53 block.

3.20. A maintenance workshop will also be operational on level 1. There will be minimal storage of liquid hazardous substances in this area, however, any storage of liquid hazardous substances in this area (such as cleaning agents) will be carried out in prefabricated cabinets with underlying containment.

3.21. Additional supporting equipment will also be installed in the HF 53 block, as shown in **Table 3.1**.

Table 3.1: Supporting equipment

Equipment	Location	Notes
New scrubber	Utilities area (Level 1)	The size of this scrubber will be enough to cater for three production lines (including line 7)
Blowdown tank	Utilities area (Level 1)	See section C3.6 for function.
Air handling units	Supply: Technical area (Level 3 intermediate) Exhaust: Roof level	For production and clean room air supply and exhaust
Thermostats	Technical area (Level 3 intermediate)	For thermoregulation (heating / cooling) of the reactors
Chillers	Technical area (Level 3 intermediate)	Used for cooling of reactors in pilot plant (line 7)
Air compressor, air dryer, breathable air system	Utilities area (Level 3)	Compressed air is used to power equipment (such as centrifuges, filters, etc.) The air dryer and breathable air systems are used in clean rooms to protect operators during some work phases
Water softener	Utilities area (Level 3)	To produce water for the production process (see section C2.7)
Heat pumps	Roof level	Used for heating / cooling for temperature / humidity control in finishing area

3.22. Additionally, solvent from the production line's heat exchangers will be collected into container/s located in the Level 1 external utilities area (HF 53 block). As this area is located outdoors, the containers will be stored on prefabricated containment similar to that shown in **Figure 3.13**.

Figure 3.13: Example prefabricated containment[4]

Non-Technical Activities

3.23. The Scheme includes other ancillary activities, including offices, toilets, and underground parking. These are non-technical activities, and therefore outside the scope of this IPPC application.

C2.2.4 Best Available Technique Assessment

3.24. The IPPC application form requires the Applicant to:

> *Include a comparison of the proposed changes to the activities with relevant BAT conclusions published by the European Commission, where these have been published.*

3.25. The Best Available Technique (BAT) assessments submitted as part of previous IPPC applications[5] are still valid.

3.26. However, as required by the current IPPC permit, an updated assessment against the Organic Fine Chemicals BREF document will be submitted by August 2019; this assessment will also include phase 1 and phase 2 of the extension.

3.27. It is noted that production processes and technologies are evaluated at the design phase, and optimised to improve performance and reduce environmental impacts, for instance by increasing production yields, lowering energy and water consumption, minimising the use of solvents where possible, reducing production time and space required, while also respecting product quality requirements.

[4] SALL Srl https://www.sall.it/public/articoli/pdf/9Sall_Catalogo_2018_Pag.21.pdf.
[5] Assessment has been made against the BREF document for the Manufacture of Organic Fine Chemicals (August 2006) and the BAT Conclusions for common waste water and waste gas treatment/ management systems in the chemical sector (Commission Implementing Decision (EU) 2016/902).

C2.2.5 Alternatives

3.28. The IPPC application form requires the Applicant to:

> *Include an outline of the main alternatives considered to the proposed changes to the technology, techniques and measures.*

3.29. In selecting the HF 53 site for expansion, consideration was given to the consequences of selecting sites elsewhere, including within the Hal Far Industrial Estate. However, a lateral expansion in the blocks adjacent to the existing site is technically and economically preferred, as it allows better flow and control of the processes, and avoids duplication of personnel.

3.30. As mentioned, production processes and technologies are evaluated at the design phase, and optimised to improve performance and reduce environmental impacts.

3.31. Examples of the alternative technologies considered in the pilot plant and the rationale for selecting a particular technology, including environmental considerations, are presented in **Table 3.2**.

Table 3.2: Alternative technologies considered

Function	Selected solution	Alternative considered	Rationale
Heating	Thermostats dedicated to pilot reactors	Steam boiler (500 kg/h)	A centralised steam system needs to work round the clock by means of electricity, LPG or diesel in order to store enough heat to be used by the different utilities. Since the heating requirement is strictly product-based in the pilot production plant, dedicated thermostats for each pilot reactor were chosen. Heating will be achieved by means of electrical resistance.
Cooling	Thermostats dedicated to pilot reactors, and smaller sized chillers	Chiller (150 kW)	A centralised chiller system needs to work round the clock by means of electricity, with compressors, fresh water and refrigerant gas in order to store enough cold water to be used by the different utilities. Since the cooling requirement is strictly product-based in the pilot production plant, dedicated thermostats and chillers for each pilot reactor were chosen. Cooling will be achieved by means of electricity, fresh air and refrigerant gas.
Process abatement	Vapour condensation, carbon filters and scrubber	Carbon filters and scrubber	Vapour condensation was included as an additional abatement system in order to recover as much solvent as possible from the process

3.32. The placement of equipment has also considered environmental impacts, whereas where possible equipment (such as the air compressor) is being placed inside a building (rather than in an external area or on the roof) to reduce visual

and noise impacts, and improve energy efficiency and increase the lifetime of the machinery.

3.33. Additionally, in the pilot plant, portable equipment (such as centrifuge, filters, and dryers) will be used to ensure better use of space.

C2.3 Raw Materials

3.34. The IPPC application form asks the Applicant to:

> *Identify any changes to the raw and auxiliary materials, and any other substances (including fuels) proposed to be used as a result of your proposals.*
>
> *If any changes are proposed, give details of quantities proposed to be used annually and submit respective MSDS sheets.*
>
> *In addition, identify the storage location of these materials on a site layout plan and give details on:*
>
> - *Maximum storage capacity;*
> - *Containment measures (including bunding capacity, where applicable);*
> - *Protective measures (including security).*

3.35. There are no proposed changes to the types of raw and auxiliary materials used in production activities as a result of these proposals. As noted in the original IPPC application, the raw materials used change periodically depending on the products produced. However, as is the current practice, the list of raw materials used in the previous year will continue to be reported as part of the Annual Environmental Report (AER) for the facility.

3.36. Existing storage arrangements will continue to be used for the raw materials used in the Scheme.

3.37. The quantities of raw material used are expected to increase only marginally, since the new production line is a pilot-scale plant. At most one tonne of solvent will be used per batch.

3.38. The annual VOC solvent consumption is already greater than the 50 tonne threshold above which the Industrial Emissions (Limitation of Emissions of Volatile Organic Compounds) Regulations, S.L.549.79, apply. This threshold will continue to be exceeded once the Scheme comes into operation. However, the Scheme includes measures for abating VOC emissions, and monitoring / calculation of VOC emissions will continue to be carried out and reported to ERA as per the current practice and IPPC permit requirements.

C2.4 Ozone Depleting Substances and Fluorinated Greenhouse Gases

3.39. The IPPC application forms require the Applicant to:

> *Identify any changes to the equipment using ozone depleting substances and fluorinated greenhouse gases, with a fluid charge of 3 kg or more.*
>
> *For each such equipment, identify the type of equipment (hermetically-sealed systems, fixed systems or mobile systems), its use (firefighting, refrigeration/air-conditioning or high-voltage switchgear), charge (in kg) and the type of substance (e.g. R22, R407c, R134a).*

3.40. These variations require the addition of new equipment containing refrigerants. The currently available information about the new equipment containing refrigerants is presented in **Table 3.3**. Indicative information is provided where specific information is not yet available; this can be updated if required by ERA once the equipment has been installed.

Table 3.3: Equipment containing refrigerants

Equipment code	Type of equipment	Use	Charge (kg)	Type of refrigerant	Charge (tonnes $CO_{2\ eq.}$)[6]	Inspection frequency
EQ 14	Air-conditioner	Temperature control in maintenance workshop	8 to 9 kg	R410-A	15.53	Annual
EQ 15	Compressed air dryer	Pilot plant (line 7)	0.5 to 1 kg	R410-A	1.73	Annual
EQ 16	Thermostat	Heating / cooling of reactors in pilot plant (line 7)	1 to 2 kg	R507 or similar	7.97	Annual
EQ 17	Thermostat	Heating / cooling of reactors in pilot plant (line 7)	1 to 2 kg	R507 or similar	7.97	Annual
EQ 18	Thermostat	Heating / cooling of reactors in pilot plant (line 7)	1 to 2 kg	R507 or similar	7.97	Annual
EQ 19	Thermostat	Heating / cooling of reactors in pilot plant (line 7)	1 to 2 kg	R507 or similar	7.97	Annual
EQ 20	Pilot chiller (+5 °C)	Cooling of reactors in pilot plant (line 7)	4 to 7 kg	R507 or similar	27.90	Annual
EQ 21	Pilot chiller (-25 °C)	Cooling of reactors in pilot plant (line 7)	4 to 7 kg	R507 or similar	27.90	Annual
EQ22	Heat pump (hot)	Heating for temperature / humidity control in finishing area (line 7)	4 to 7 kg	R410-A	12.08	Annual

[6] The maximum charge and indicated refrigerant have been used for this calculation.

Equipment code	Type of equipment	Use	Charge (kg)	Type of refrigerant	Charge (tonnes $CO_{2\ eq.}$)[6]	Inspection frequency
EQ23	Heat pump (cold)	Cooling for temperature/humidity control in finishing area (line7)	15 to 20 kg	R410-A	34.50	Annual
EQ24	Air-conditioner	Temperature control for laboratory	5 to 10 kg	R410-A or similar	17.25	Annual
EQ25	Air-conditioner	Temperature control for laboratory	5 to 10 kg	R410-A or similar	17.25	Annual
EQ26	Air-conditioner	Temperature control for laboratory	5 to 10 kg	R410-A or similar	17.25	Annual
EQ27	Air-conditioner	Temperature control for office	5 to 10 kg	R410-A or similar	17.25	Annual

3.41. The equipment is all fixed, but not hermetically sealed. The location of this equipment is shown in **Figure 3.14**.

3.42. The above equipment will be checked for leaks according to the frequency stipulated in Regulation 517/2014/EU. The indicative inspection frequency (based on the currently available information) will be as listed in **Table 3.3**.

Figure 3.14: Location of refrigerant-containing equipment

C2.5 Maintenance

3.43. ERA's ToR require:

> *Describe any changes to the maintenance programme for the installation.*

3.44. The facility has a maintenance plan in place (MN.SOP.001 rev.011 dated July 2018, already supplied to ERA previously). This will be updated to include any new equipment installed as part of these proposals once that equipment has been installed; this includes the new HEPA filters. Maintenance requirements will be in accordance with manufacturer specifications and with any applicable legal requirements.

3.45. Once the maintenance plan has been updated, a copy can be made available to ERA if required.

C2.6 Energy

3.46. ERA's application form requires the Applicant to:

> *C2.6.1: Describe any changes to the annual energy consumption, highlighting the main energy-consuming equipment, and generation by source and end-use (including information on energy generated on site, if applicable).*
>
> *C2.6.2: Describe any changes to the proposed basic measures for improvement of energy efficiency.*

3.47. The main users of electrical energy in the Scheme will be the same as in the current operations, namely production and analysis activities, and ancillary equipment: examples include dryers, compressors, and laboratory instruments. Electricity consumption will increase as a result of the planned expansion, as shown in **Table 3.4**.

Table 3.4: Estimated annual energy consumption

Source	Current consumption	Current consumption + Scheme
Electricity (MWh)	1,630	2,445

3.48. Since the Scheme consists of a pilot plant, heating of the reactors will be achieved using thermostats (rather than with steam generators), and cooling will be achieved using thermostats and smaller sized chillers (rather than with a larger chiller). Since heating will be provided by means of electrical equipment and not by a steam generator, there will be no increase in LPG consumption as a result of the Scheme.

3.49. As mentioned in section C2.2.4, production processes and technologies take into account environmental considerations, including by optimising energy usage.

3.50. Indoor lighting will be based on energy efficient systems (LED or similar) to minimise consumption.

C2.7 Water

3.51. ERA's Terms of Reference are:

> *Provide a breakdown of any changes to the proposed annual water consumption by source and end-use.*

3.52. At the Scheme, water will be used for the following purposes:

- Production activities: for example as a raw material or solvent, in the scrubber, as a refrigerant in the cooling system (closed-circuit system), and for laboratory uses;
- Washing of production equipment and premises;
- Landscaping; and
- Domestic purposes, such as in the toilets, showers, and canteen.

3.53. Water will primarily be supplied from the mains water system, with the exception of water used for firefighting and irrigation, which are obtained from the rainwater reservoirs (as described further in section C3.5).

3.54. At the Scheme, mains water intended for use production and plant / system cleaning activities will be purified using a water softener. This will be installed in the utilities area (Level 3 in the HF 53 block). Reject from this softener will be discharged to the new rainwater reservoir in the HF 53 block; the overflow from this reservoir is discharged to below street level (to road level if the main overflow fails).

3.55. Since the Scheme is a small-scale plant, the predicted increase in water consumption will be relatively small, as shown in **Table 3.5**.

Table 3.5: Estimated annual water consumption

Source	Current consumption (2018)	With Phase I (pilot plant)
Mains water (m^3)	5,400	6,750

C2.8 Risk Assessment

3.56. ERA's Terms of Reference (ToR) require the Applicant to:

> *Describe any changes to the documented system used to identify, assess and minimise the environmental risks and hazards of accidents and their consequences.*

Include any changes to emergency plans in case of fire, actions to be taken in case of failure of abatement equipment and other environmentally relevant incidents (e.g. spillages, gas leakage).

3.57. An environmental risk assessment for the proposed extension to the facility (both phase 1 and phase 2) has been prepared as part of the EIA update; a copy is included with **Volume 1** for reference.

Emergency Procedures

3.58. The facility's emergency procedures are governed by document MIOS-4.4.7: Emergency and evacuation plan. There are also several related procedures, including:

- MIOS_ 4.4.7-A: Procedure to follow in case of fire;
- MIOS_ 4.4.7-B: Operating instructions for fire extinguishers, fire hoses and mobile foam units use (for fire fighters);
- MIOS_ 4.4.7-C: Procedure to follow in case of spill or release or contact with hazardous substances;
- MIOS_ 4.4.7-D: Procedure to follow in case of failure or malfunction of appliance;
- MIOS_ 4.4.7-E: Procedure to follow in case of injury or illness;
- MIOS_ 4.4.7-F: Procedure to follow for the safety of the plant and the employees;
- MIOS_ 4.4.7-G: Procedure to follow in case of earthquake, flood, power emergency;
- MIOS_ 4.4.7-H: Procedure to follow in case of emergency (covering notification and evacuation);
- MIOS_ 4.4.7-I: Emergency and evacuation procedure (covering emergency procedures in more detail); and
- MIOS_ 4.4.7-L: Procedure to adopt in the event of oxygen-deficient atmosphere.

3.59. The above procedures are being reviewed as part of the facility's application for certification to the ISO 14001 Environmental Management System standard, and will also apply to the Scheme. A copy will be provided to ERA once these are finalised, if required.

Fire Safety

3.60. The existing 600 m^3 reservoir on the HF 51 block will now be reserved exclusively for firefighting of the entire site. This is kept full at all times, and a

level meter with alarm is installed for this purpose. This volume is able to provide up to 150 minutes of firefighting water.

3.61. An external company has been engaged to draw up fire detection and firefighting plans for the Scheme. In the HF 53 block, an automatic fire detection system will be in place. This will include smoke detectors fitted with an acoustic alarm and beacon, as well as break glass manual call points.

3.62. The firefighting system in the HF 53 block will include a sprinkler and wet mains system, connected to the existing fire pump, as well as fire cabinets containing fire extinguishers and a fire blanket. The firefighting arrangements in the HF53 block are summarised below:

- **Level 0** (parking): Class ABC dry chemical, foam, CO_2 fire extinguishers, water (including sprinklers), fire blankets;
- **Level 1**: No sprinklers on this level:
  - Production lines, clean rooms, warehouse, workshop, boiler room: Class ABC dry chemical fire extinguishers (no water);
  - Ante-room to production areas: Foam fire extinguishers;
  - Terrace, road, store, stairwell next to utilities area: Water.
- **Level 2** (double height over level 1): No sprinklers on this level:
  - Clean room plant area: Class ABC dry chemical fire extinguisher (no water);
  - Office area: Class ABC dry chemical, foam, CO_2, fire extinguishers, water, fire blankets;
- **Level 3 and Level 3 intermediate**: No sprinklers on these levels:
  - External areas: Water, Class ABC dry chemical, foam fire, and CO_2 fire extinguishers, fire blankets;
  - Data room / UPS, stairwells: Water; and
- **Roof level**: Class ABC dry chemical fire extinguishers, fire blankets.

3.63. Drawings of the fire detection and firefighting systems in this block are included in **Annex 2**.

Spill Management

3.64. Indoor areas in the new HF 53 block will be underlain by an impermeable concrete layer. The pilot plant will have an epoxy resin coating on the floor; the finishing area (i.e. the clean room and pilot warehouse) will have vinyl flooring. The production line (including the clean room and warehouse) will have stainless steel gutters around the internal perimeter, draining to a 74 m^3 'water washing

reservoir' at the northeastern corner of the HF 53 block. The gutters will collect any spilt effluent and wash water from floor washing.

3.65. Spills in the laboratories in HF 53 block will be collected in floor drains, and diverted to the above 74 m^3 'water washing reservoir' (in some cases after collection in a smaller 'spillage reservoir'). Laboratory floors will be tiled with acid-resistant tiles and acid-resistant grout.

3.66. Further details are included in section C3.1.

3.67. Spill kits will also be included in the new production line and in the laboratories.

3.68. An Addendum to the original Land and Groundwater Risk Assessment has also been prepared as part of this IPPC application; this is included as **Volume 3**. This Risk Assessment concludes that the risks to land and groundwater from the Scheme range from none (where there is no pollutant linkage) to low and very low.

C2.9 Training

3.69. The IPPC Application Form requires the Applicant to:

> *Please indicate whether any changes to the staff training programme will be required. Please submit the name of the technically competent person on site who will be responsible for such training.*

3.70. The procedure governing the identification of training needs and implementation of a training programme is MPA_4.4.2 (copy submitted to ERA previously). This procedure was already identified as part of the original IPPC application, and will continue to apply.

3.71. This procedure aims to ensure that any persons working for or on behalf of the facility involved in activities that could have an impact on the environment are properly trained to carry out their assigned duties in a manner that will not cause deviation from the company environmental policy (whereas the policy includes a commitment to comply with applicable legal requirements and other environmental requirements to which the Company subscribes, i.e. including its IPPC permit).

3.72. The procedure also requires the implementation of an annual training plan, and maintenance of training records. Therefore the activities covered by these proposed variations will be included in the forthcoming training plan for the Scheme, and corresponding records kept.

C2.10 Cessation

3.73. The IPPC Application Form requires the Applicant to:

> *Describe any changes to the outline decommissioning plan describing the draft proposed measures upon definitive cessation*

of activities, to avoid any pollution risk and return the site of the installation to a satisfactory state (including relevant measures for the design and construction of the installation).

This plan shall include a draft waste management strategy, and a qualitative assessment of the potential for contamination of land and groundwater pollution which might arise from the historical and current processes carried out at the installation.

3.74. The outline decommissioning plan submitted as part of the original IPPC application will apply to the Scheme.

4. EMISSIONS

C3.1 Waste

4.1. ERA's ToR require:

> *C3.1.1: Characterise (using the European Waste Catalogue code, in accordance with LN 184 of 2011 as amended) and quantify any changes to each waste stream from the installation.*
>
> *C3.1.2: Describe any changes to the proposed measures for waste management, storage and handling. If any are identified, also indicate the storage location of wastes on a site layout plan and give details on:*
>
> - *Maximum storage capacity;*
> - *Containment measures (including bunding capacity, where applicable);*
> - *Protective measures (including security).*
>
> *C3.1.3: Describe how each waste stream identified in C3.1.1 is prepared for re use, recycled, recovered or disposed of. If you propose any disposal, explain why recovery is technically and economically impossible and describe the measures planned to avoid or reduce any impact on the environment.*
>
> *For these wastes, give details on authorised disposal/recovery facilities proposed to be used for each waste. If any on-site recovery of waste is proposed, provide details.*
>
> *For each of these wastes, give details on off-site transportation, including registered waste carriers/brokers to be used.*

Waste Identification

4.2. The original IPPC application (section B3.1) already included the identification of the waste types generated by the facility. Since the production processes in the Scheme will be similar to the existing ones, no new waste types are envisaged.

4.3. The total waste quantities generated annually will increase only slightly as a result of the Scheme, since this is a pilot plant. Transfers of waste off-site are recorded, and reported annually to ERA as part of the Annual Environmental Report (AER).

4.4. The main waste types and estimated quantities that will be generated from the Scheme are indicated in **Table 4.1**.

Table 4.1: Waste generated by the Scheme

EWC code	Description	Estimated annual quantity generated (tonnes) - Phase 1 only
07 07 01*	Aqueous washing liquids and mother liquors	11
16 10 01*	Aqueous liquid wastes containing hazardous substances	5
07 07 03*	Organic halogenated solvents, washing liquids, and mother liquors	4
07 07 04*	Other organic solvents, washing liquids, and mother liquors	9
06 01 02*	Hydrochloric acid	0.003
06 01 06*	Other acids	0.02
07 07 10*	Other filter cakes and spent absorbents	0.45
15 01 10*	Packaging containing residues of or contaminated by hazardous substances	0.6
15 02 02*	Absorbents, filter materials (including HEPA filters), wiping cloths, protective clothing contaminated by dangerous substances	0.2
16 05 08*	Discarded organic chemicals consisting of or containing hazardous substances	0.03
16 05 06*	Laboratory chemicals, consisting of or containing hazardous substances, including mixtures of laboratory chemicals	0.01
15 01 02	Plastic packaging	0.2
15 01 01	Paper and cardboard packaging	0.1
15 01 03	Wooden packaging	0.2
20 03 01	Mixed municipal waste	0.6

Waste Management

4.5. Waste will largely continue to be stored on site as per the existing arrangements.

4.6. However, any spilt effluent and wash water from floor washing of the Scheme will drain through gutters located around the internal perimeter, to a 74 m^3 'water washing reservoir' at the northeastern corner of the HF 53 block. It is noted that wastewater generated from production or from washing of production equipment is not drained to this reservoir, but is pumped out into IBCs and discarded as hazardous waste.

4.7. Effluent from the sinks and floor drains in the laboratories in HF 53 block will be managed as follows:

- Liquids from the two laboratories at the southern end of the HF 53 block will be directed to a small 'water spillage reservoir'; this is connected to the 74 m^3 'water washing reservoir'; and
- Liquids from the laboratories at the northern end of the HF 53 block will be received directly in the 74 m^3 'water washing reservoir'.

4.8. Laboratory waste generated in relatively larger quantities will be collected by staff into containers and discarded as hazardous waste. Laboratory floors will be tiled with acid-resistant tiles and acid-resistant grout.

4.9. The reservoirs will be made of concrete and lined with HDPE to ensure impermeability; testing for impermeability will be carried out as required by the IPPC permit. Plans and sections of the reservoirs are shown in **Figure 4.1** to **Figure 4.3**.

4.10. Reject from the new water softener will be discharged to the new rainwater reservoir in the HF 53 block, as it will contain minimal constituents.

Waste Transfers

4.11. All waste on site will continue to be transferred to licensed facilities using authorised waste carriers, and records will continue to be maintained and reported to ERA as per current practice. The movements will also be covered by transfer permits, when required, as is the current practice.

4.12. Effluent collected in the new water washing reservoir will be discarded as hazardous waste, and an alarm will be in place to ensure no overfilling. Effluent from the reservoir will pumped out to lorry. During such transfers, the lorry will park in a designated area bounded with gutters to collect any spills during such transfers, which are diverted back to the reservoir. The valve connecting this zone to the reservoir will normally be kept closed, to avoid rainwater entering the reservoir, but will be opened during the filling process.

Figure 4.1: Water washing reservoir – plan and section

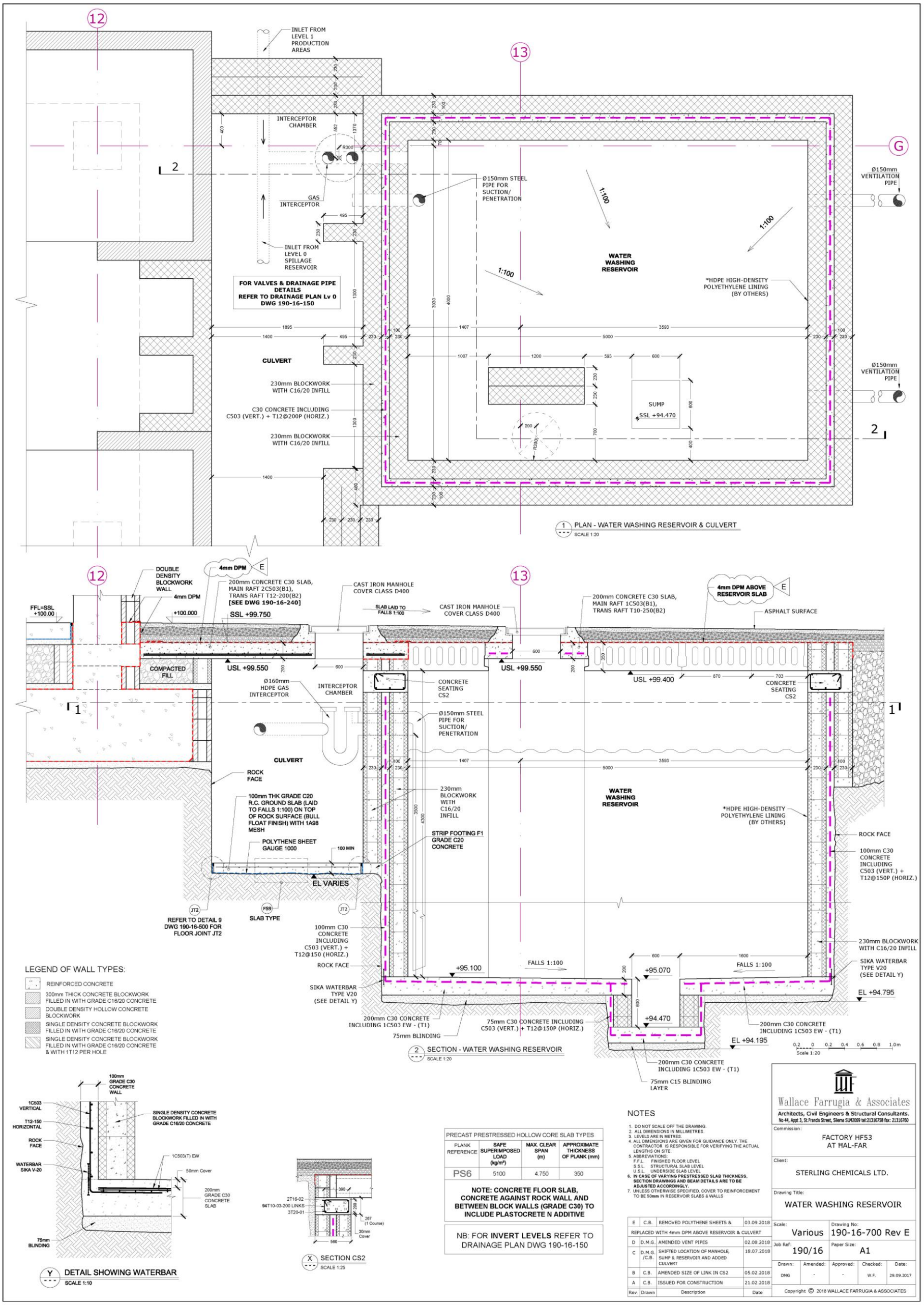
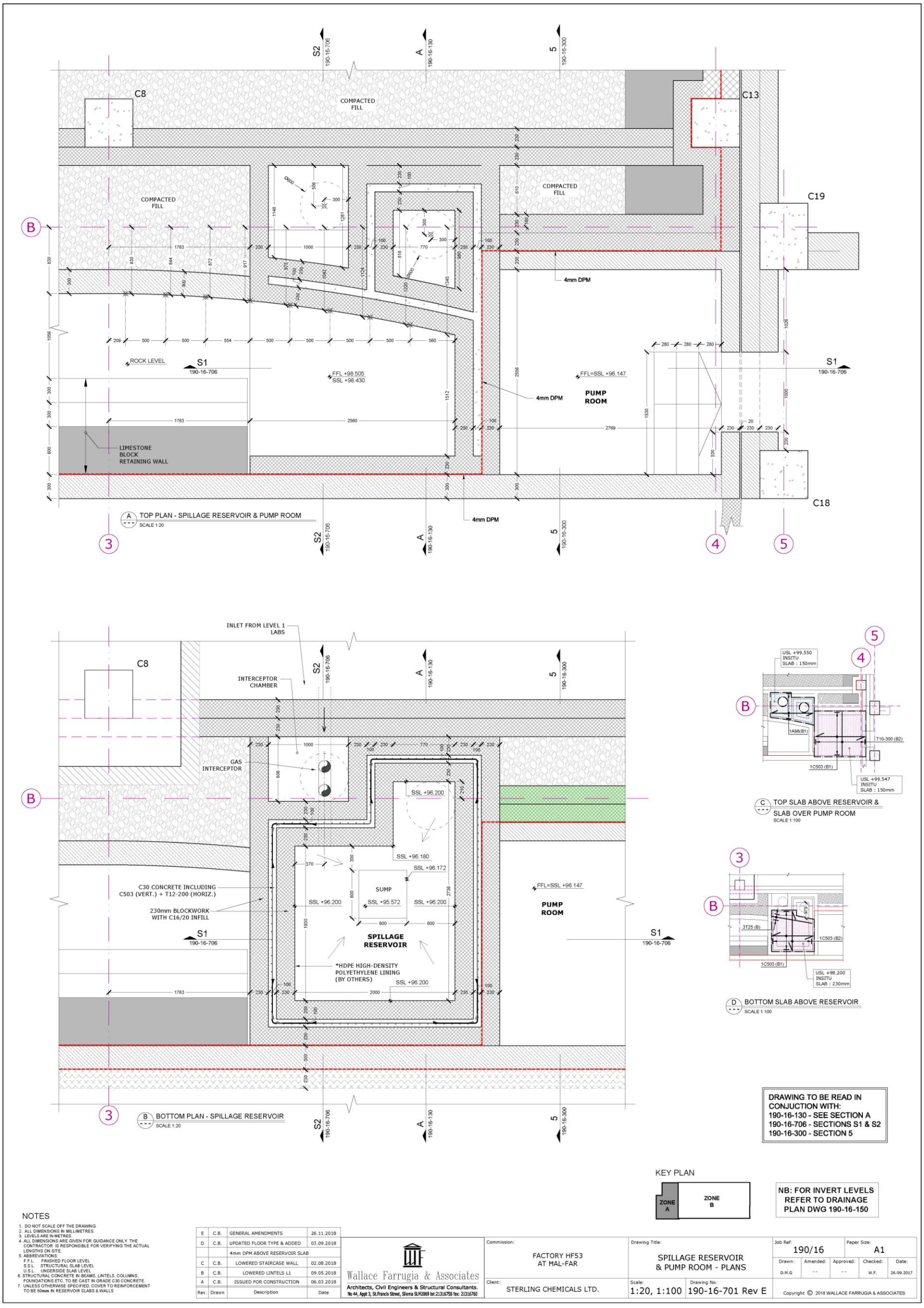


Figure 4.2: Spillage reservoir – plans



DRAWING TO BE READ IN CONJUCTION WITH:
190-16-130 - SEE SECTION A
190-16-706 - SECTIONS S1 & S2
190-16-300 - SECTION 5

KEY PLAN

ZONE A | ZONE B

NB: FOR INVERT LEVELS REFER TO DRAINAGE PLAN DWG 190-16-150

NOTES

1. DO NOT SCALE OFF THE DRAWING.
2. ALL DIMENSIONS IN MILLIMETRES.
3. LEVELS ARE IN METRES.
4. ALL DIMENSIONS ARE GIVEN FOR GUIDANCE ONLY. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE ACTUAL LENGTHS ON SITE.
5. ABBREVIATIONS:
   F.F.L. FINISHED FLOOR LEVEL
   S.S.L. STRUCTURAL SLAB LEVEL
   U.S.L. UNDERSIDE SLAB LEVEL
6. STRUCTURAL CONCRETE IN BEAMS, LINTELS, COLUMNS, FOUNDATIONS ETC. TO BE CAST IN GRADE C30 CONCRETE.
7. UNLESS OTHERWISE SPECIFIED, COVER TO REINFORCEMENT TO BE 50mm IN RESERVOIR SLABS & WALLS

Rev.	Drawn	Description	Date
E	C.B.	GENERAL AMENDMENTS	26.11.2018
D	C.B.	UPDATED FLOOR TYPE & ADDED	03.09.2018
		4mm DPM ABOVE RESERVOIR SLAB	
C	C.B.	LOWERED STAIRCASE WALL	02.08.2018
B	C.B.	LOWERED LINTELS L1	09.05.2018
A	C.B.	ISSUED FOR CONSTRUCTION	06.03.2018

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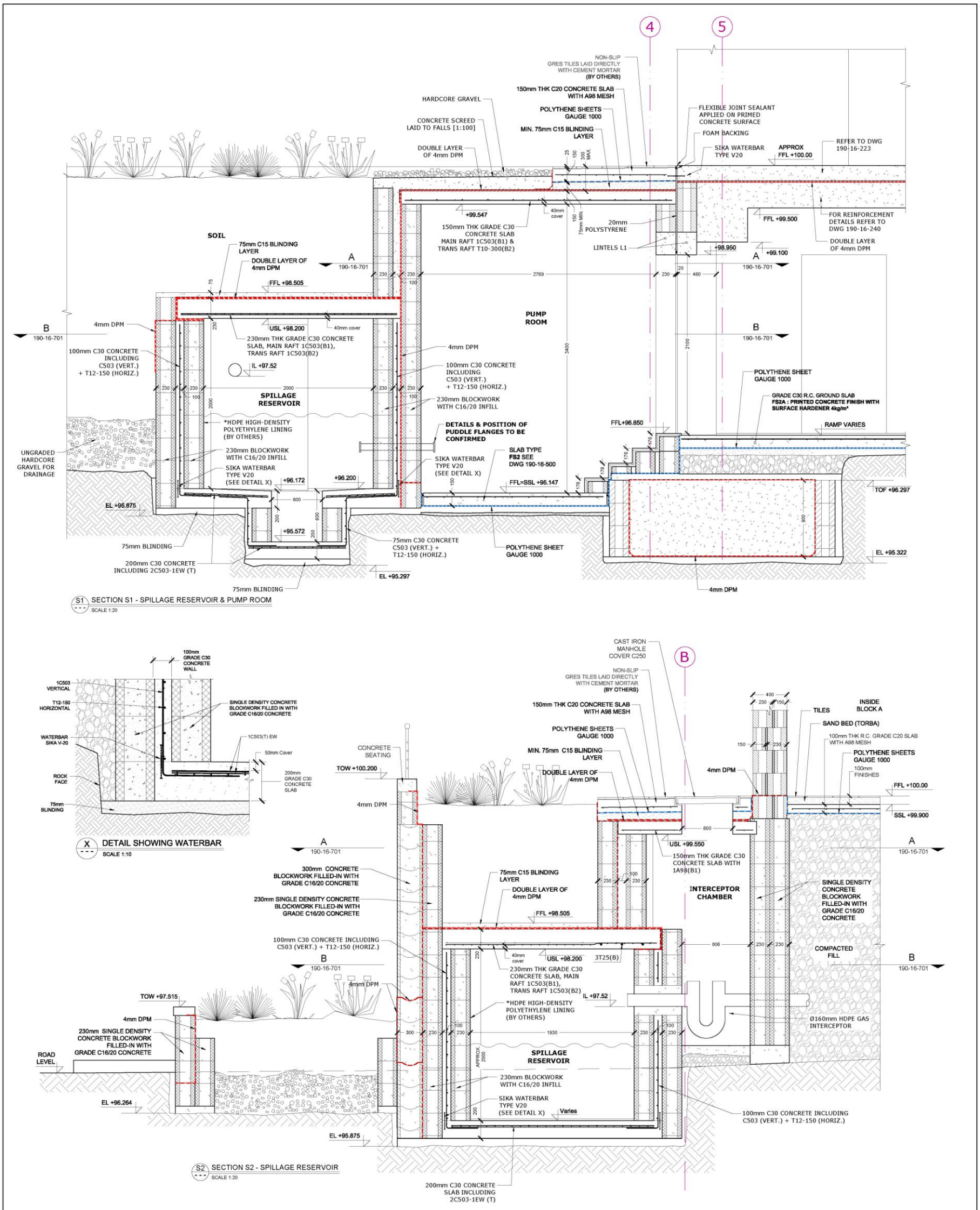
Commission: FACTORY HF53 AT HAL-FAR	Drawing Title: SPILLAGE RESERVOIR & PUMP ROOM - PLANS	Job Ref: 190/16	Paper Size: A1
		Drawn: D.M.G / Amended: -- / Approved: -- / Checked: W.F. / Date: 26.09.2017	
Client: STERLING CHEMICALS LTD.	Scale: 1:20, 1:100	Drawing No: 190-16-701 Rev E	Copyright © 2018 WALLACE FARRUGIA & ASSOCIATES

Figure 4.3: Spillage reservoir – sections



NOTES

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7. UNLESS OTHERWISE SPECIFIED, COVER TO REINFORCEMENT TO BE 50mm IN RESERVOIR SLABS & WALLS

NB: FOR INVERT LEVELS REFER TO DRAINAGE PLAN DWG 190-16-150

KEY PLAN

ZONE A | ZONE B

Rev.	Drawn	Description	Date
-	-	-	-

Wallace Farrugia & Associates
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No 44, Appt 3, St.Francis Street, Sliema SLM2069 tel:21316758 fax: 21316760

Commission:	FACTORY HF53 AT HAL-FAR
Drawing Title:	SPILLAGE RESERVOIR & PUMP ROOM - SECTIONS
Client:	STERLING CHEMICALS LTD.
Scale:	1:20, 1:10
Drawing No:	190-16-706
Job Ref:	190/16
Paper Size:	A1
Drawn:	D.M.G
Amended:	--
Approved:	--
Checked:	W.F.
Date:	26.11.2018

C3.3 Emissions to Sewer

4.13. ERA's ToR ask the Applicant:

> *C3.3.1: Is a new sewer connection envisaged as a result of your proposal? If yes, please submit a block plan of the site, showing the proposed layout of sewer connections and any other drains (colour-coded), as well as the proposed discharge point(s).*
>
> *C3.3.2: If a new sewer connection is envisaged, does the installation have a Sewer Discharge Permit? Please submit a copy of the permit, or of the submitted application if the permit has not yet been issued.*
>
> *C3.3.3: Could the proposal involve the release of any Schedule A or Schedule B substance into the sewers, or changes to releases? If yes, explain how the requirements of LN 139 of 2002 have been addressed.*
>
> *C3.3.4: Are new or changes to cesspit/s being proposed? If yes, please provide certification by an independent, warranted engineer showing that each cesspit is in line with the requirements of Schedule 1 Activity 43 of LN 106 of 2007 (as may be amended).*

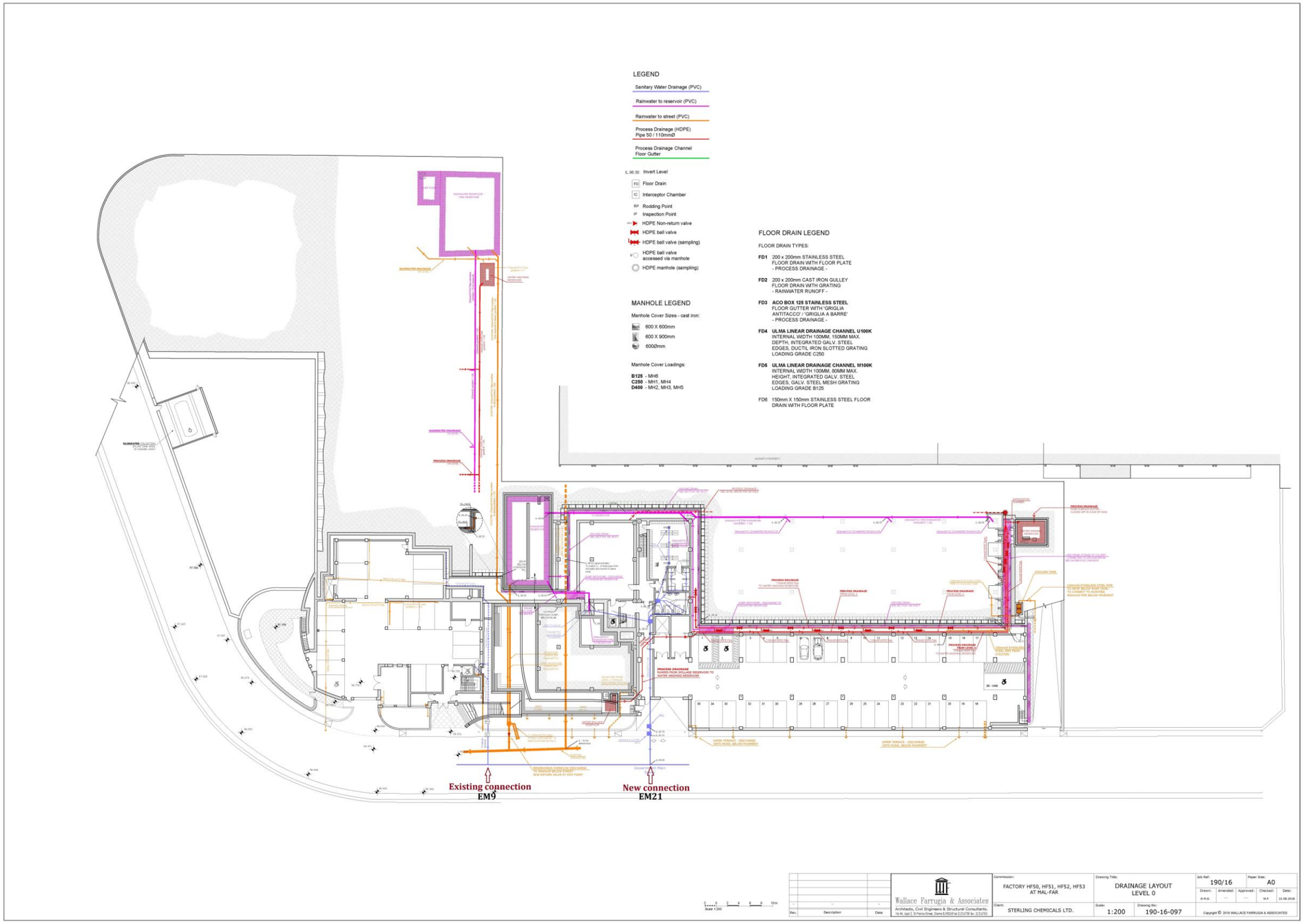
4.14. Only sanitary waste will be discharged to sewer from the Scheme, from the changing rooms and toilets in the HF 53 block.

4.15. A new connection point to the main sewer line is proposed as shown in **Figure 4.4**. Therefore the facility will now have two connection points to the main sewer line (labelled as EM9 and EM21 in **Figure 4.4**).

4.16. The existing operations are already covered by a Sewer Discharge Permit (DMU 6745; a copy is included in **Volume 1** of the IPPC application. Since the new connection will only discharge domestic effluent, the Water Services Corporation only requires a variation application for the Sewer Discharge Permit in 2020; a copy of this correspondence is included in **Volume 1**.

4.17. No cesspits for sanitary waste are proposed. However, a 'water spillage reservoir' and 'water washing reservoir' will be installed; details are provided in section C3.1.

Figure 4.4: Connections to sewer



C3.5 Rainwater

4.18. ERA's ToR ask the Applicant to:

> *Describe any changes to how rainwater is handled on site. If any changes are proposed, attach a site drainage map indicating rainwater capture and harvesting/discharge.*

4.19. Clean rainwater from the roof of the HF 53 block will be collected in a new underground reservoir having a capacity of 1,032 m^3. This reservoir overflows below street level (with clean water draining to the Wied Żnuber valley); a street-level discharge will be in place in case the main overflow fails. Water from this reservoir will be used on site for irrigation.

4.20. Rainwater from the internal roads surrounding the production area, and from the production building terrace will discharge to below street level.

4.21. A land drain will also be installed at level 0 of the HF 53 block; this is used to collect rainwater that percolates through the ground. Such rainwater is collected in two sumps, then pumped to the above-mentioned rainwater reservoir.

4.22. Rainwater management arrangements are shown in **Figure 4.5** and **Figure 4.6**.

4.23. The existing 600 m^3 reservoir in block HF 51 will be reserved exclusively for firefighting purposes, and will service the entire facility (i.e. the existing site plus the Scheme).

Figure 4.5: Rainwater management (Level 0)

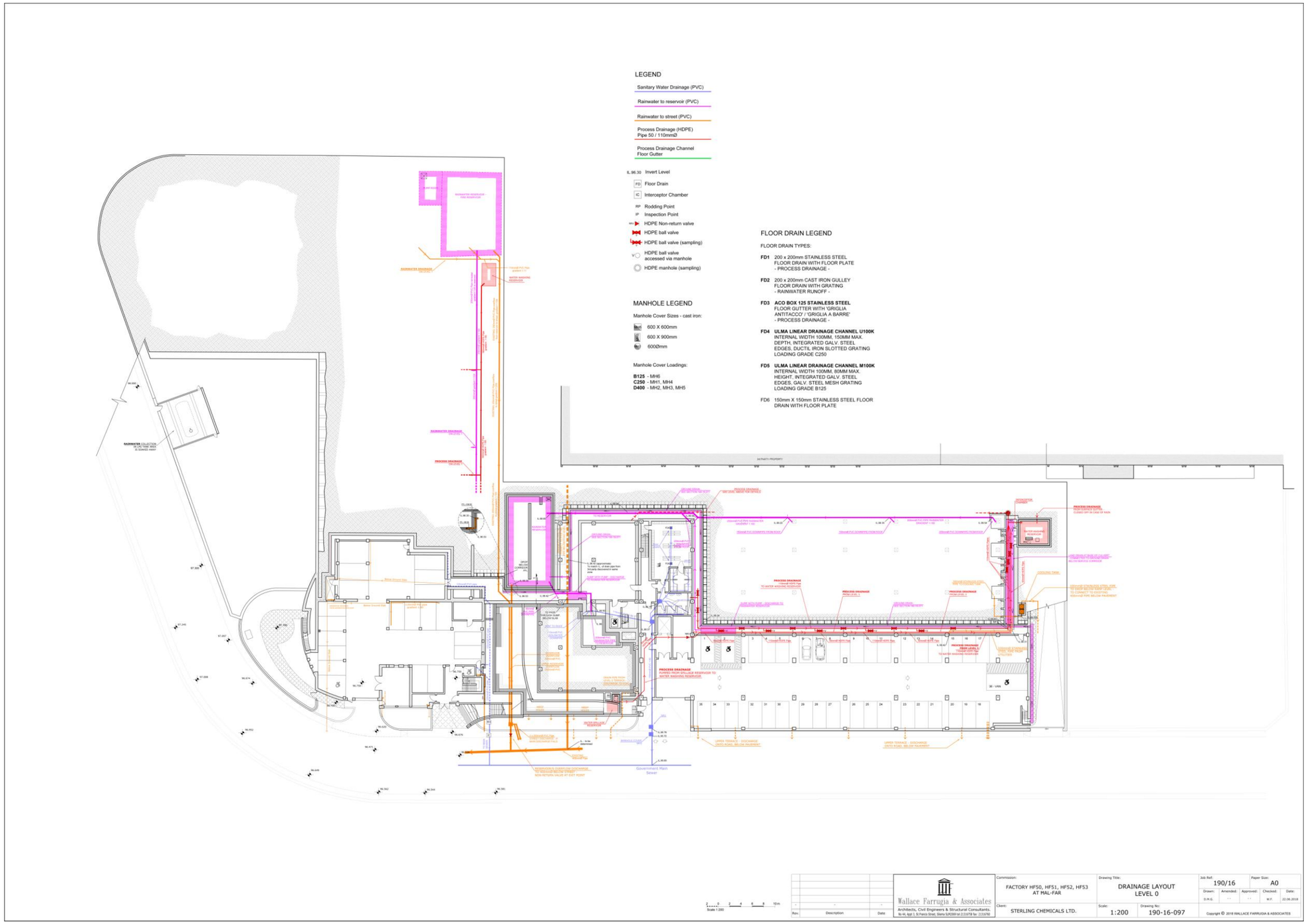
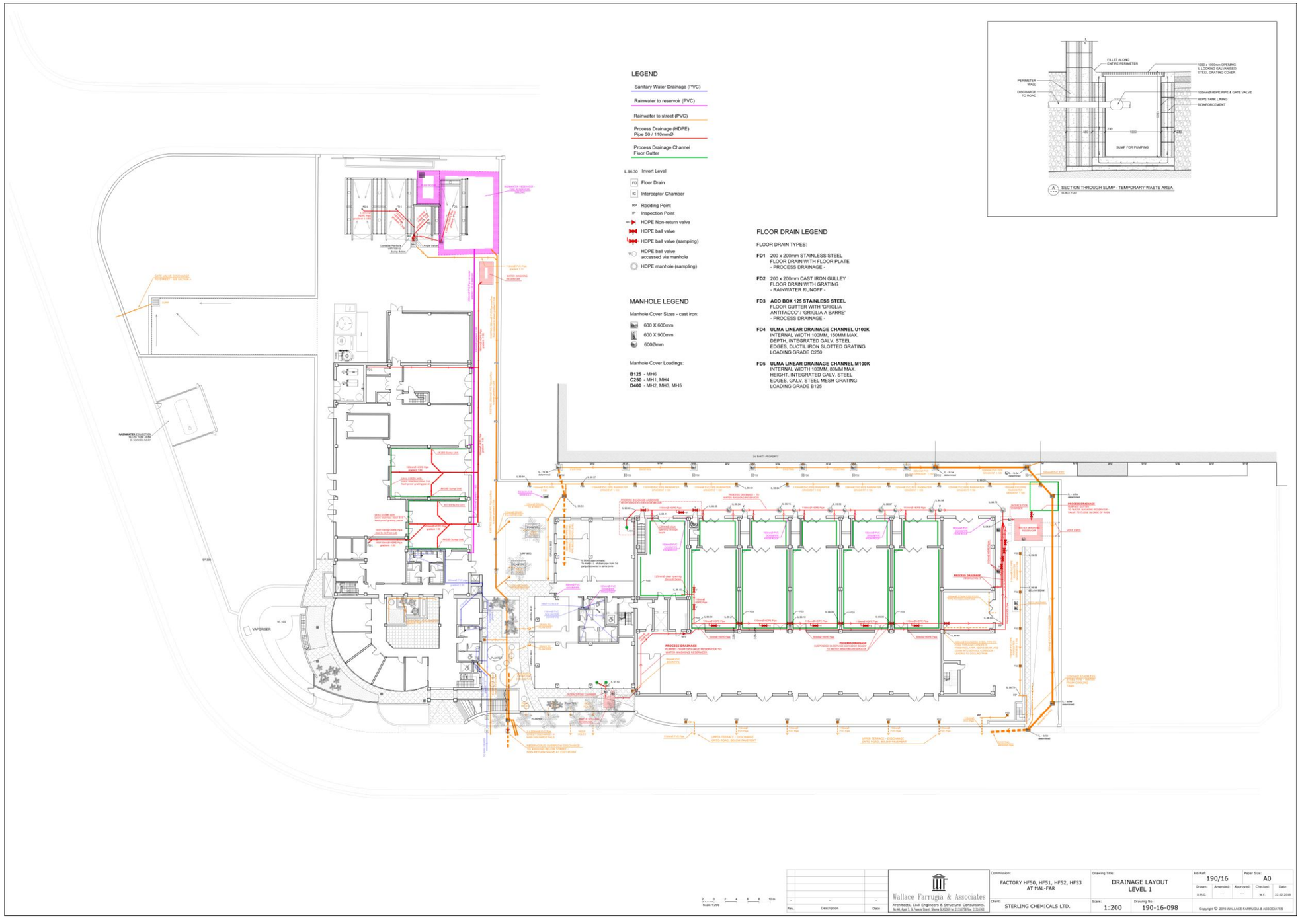


Figure 4.6: Rainwater management (Level 1)



C3.6 Emissions to Air

4.24. ERA's application form requires the Applicant to:

> *Identify if there may be any changes in emissions of substances to air.*
>
> *If any are identified, submit details of each emission point, the nature and the proposed quantities of substances emitted from each point and treatment/abatement measures. A block plan of the site showing each emission point should be submitted.*
>
> *For each new boiler/generator, submit the following details: rated thermal input, energy output, date of manufacture, stack height, fuel type and annual fuel consumption.*

4.25. Emissions from the new reactors in the new production lines will be routed to a new scrubber (EM13). As with the existing reactors, each reactor will be connected to a heat exchanger to condense organic vapours; the entire reactor line is also connected to a second, larger heat exchanger, following which vapours are treated in a carbon filter and the scrubber. The scrubber will have a 12-metre long stack, and the scrubbing medium used will be water (same as with the existing scrubber).

4.26. This scrubber is sized to handle the process vents of three production lines (5,000 m^3 capacity), therefore it has ample capacity to cater for the pilot plant.

4.27. In case of an emergency condition in the reactors, a blowdown tank will be in place as a safety measure (as with the existing production lines). Blowdown tanks enable safe and quick emptying of reactors, which is important to prevent harm to persons, equipment, and also the environment if an abnormal situation requiring quick release of pressure in the reactors occurs. The blowdown tank for Phase 1 will be located in the Utilities area (Level 1, HF53). Emissions from the blowdown tank are then routed to the scrubber (EM 13).

4.28. One new emission point covering general ventilation from the new production line is also being introduced (EM 14). Exhaust air from this area is released through air grilles having a basic fabric filter; the available information on this system is included in **Annex 3**. It is noted that no handling of powder is carried out in these areas, and if any containers are opened (e.g. reactors or IBCs), local extraction will be used which is directed to the new scrubber (EM 13).

4.29. Emissions from the new clean room in the pilot plant will be treated using a HEPA H13 filter; it is noted that the filter, dryer and centrifuge are installed in the clean room. Specification sheets for such filters are included in **Annex 4**; these show that the filtration efficiency is greater than 99.95%. It is noted that a differential pressure device is installed before and after each HEPA filter in order to monitor the operation of the filter; the filters will also be included in the facility's maintenance programme and replaced as per the maintenance schedule.

4.30. The new laboratories will include fume hoods, emissions from which will be treated through a carbon filter prior to release at roof level (EM16 – EM20). Specification sheets for the carbon filters are included in **Annex 5**. Additionally a HEPA H13 filter will also be installed on the suction hoods (balance enclosure) where weighing of powders is carried out; the treated air will exhaust inside the same laboratory. Specification sheets for HEPA filters are included in **Annex 4**.

4.31. No new boilers, emergency electricity generators, or cooling towers are proposed as part of the Scheme.

4.32. The new emission points to air are summarised in **Table 4.2. Figure 4.7** shows the location of the new and existing air emission and sewer discharge points; EM1 to EM12 are existing emission / discharge points, while EM21 is a new sewer discharge point (as described in section C3.3).

Table 4.2: New emission points to air

Source	Main emission types	Abatement	Emission point
Pilot plant reactors	VOC, NO_x, particulates	Two heat exchangers in series, carbon filter and scrubber	EM 13 (scrubber)
Blowdown tank (emergency use only)	VOC, NO_x, particulates	Scrubber	EM 13
Local extraction in HF 53 production block, used when opening reactors / containers	VOC, NO_x, particulates	Scrubber	EM 13
HVAC system for line 7	Emission of air coming from HVAC system (air conditioning and general ventilation)	Not applicable – exhaust through air grilles with fabric filter	EM14
HVAC system for clean room line 7	Particulates	HEPA filter	EM15
HF 53 laboratory fume hoods	Solvents / chemicals / powders (small quantities)	• Fume extractor hoods: carbon filter • Balance enclosure for weighing powders: HEPA H13 filter	EM16 – EM20

Figure 4.7: Emission points to air

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Commission: FACTORY HF53 AT HAL-FAR

Client: STERLING CHEMICALS LTD.

Drawing Title: PLAN LEVEL 4 ROOF

Scale:	Drawing No:
1:250	190-16-096
Job Ref: 190/16	Paper Size: A2

Drawn:	Amended:	Approved:	Checked:	Date:
DMG	-	-	W.F.	22.02.2019

Rev.	Drawn	Description	Date
-	-	-	-
-	-	-	-
-	-	-	-

C3.9 Noise

4.33. The IPPC application form requires the Applicant to:

> *Describe:*
>
> ***C3.9.1:*** *The main sources of noise and vibration (including infrequent sources) of the new proposal;*
>
> ***C3.9.2:*** *The proposed techniques and measures for control of noise;*
>
> ***C3.9.3:*** *The nearest noise sensitive locations and distance away from the site (a site map may be submitted for this purpose); and*
>
> ***C3.9.4:*** *Relevant environmental noise measurement surveys which have been undertaken (monitoring shall be according to the latest revisions of ISO1996 and the rating of industrial noise affecting residential areas shall be according to BS 4142; monitoring shall be carried out exclusively using type 1 sound level meter).*

4.34. Noise-generating activities from the Scheme are likely to be similar to those already existing at Sterling Chemical, however, on a smaller scale since the Scheme is a pilot plant.

4.35. The main new generators of noise at the Scheme are identified in **Table 4.3**, together with sound pressure information where available.

Table 4.3: Main noise sources

Equipment	Location	Sound pressure level
HVAC production line 7 (supply)	Indoor (Level 3, Intermediate)	62 dBA (at 1 m, free field)
HVAC production line 7 (exhaust)	Outdoor, on roof (emission point EM14)	60 dBA (at 1 m, free field)
HVAC clean room line 7 (supply)	Indoor (Level 3, Intermediate)	60 dBA (at 1 m, free field)
HVAC clean room line 7 (exhaust)	Outdoor, on roof (emission point EM15)	55 dBA (at 1 m, free field)
Heat pump (hot) line 7	Outdoor, on roof	37.6 dBA (at 10 m)
Heat pump (cold) line 7	Outdoor, on roof	46.5 dBA (at 10 m)
Scrubber fan	Outdoor (external utilities area)	81.8 (at 1.5 m, free field); this is the same as the existing scrubber
Thermostats line 7	Indoor (Level 3, Intermediate)	57 dBA (distance not specified in datasheet)
Pilot chiller line 7	Indoor (Level 3, Intermediate)	No information available in datasheet
Compressor	Indoor (Level 3)	65 dBA (at the work station)
Water softener	Indoor (Level 3)	Not a significant noise source, since this will only consist of four small pumps

4.36. Since the noise generated is from equipment similar to that already installed at the facility, and the site is located in an industrial area surrounded by existing industrial uses (and some distance away from sensitive receptors), impacts on noise sensitive receptors are not expected. Additionally, several of the equipment will be located indoors.

4.37. Nevertheless, the IPPC permit already requires noise monitoring to be carried out periodically, and the next monitoring session is required once the microniser is commissioned. It is therefore suggested that noise monitoring for the pilot plant would be synchronised with that for the microniser, to enable an assessment of noise impacts from both plant.

C3.10 Monitoring

4.38. ERA's application form requires the Applicant to:

> *Describe the proposed measures for monitoring emissions arising from the proposal, including any environmental monitoring. The following must be specified:*
>
> ***C3.10.1:*** *The location of each proposed monitoring point (plotted on a suitably-labelled block plan of the site);*
>
> ***C3.10.2:*** *The substances (in each environmental medium) which are proposed to be monitored;*
>
> ***C3.10.3:*** *The frequency with which monitoring is proposed to take place;*
>
> ***C3.10.4:*** *The proposed measurement methodology, which should be a standard methodology, such as EN or ISO standard, or equivalent;*
>
> ***C3.10.5:*** *The proposed procedure for evaluation of the results.*

4.39. The relevant emissions associated with these proposals are emissions to air and noise emissions. There will be no discharge of industrial effluent to sewer from the Scheme, therefore monitoring of discharges to sewer is not required.

4.40. A monitoring proposal for emissions to air is included in **Table 4.4**. This takes into consideration the monitoring requirements of the current IPPC permit (for existing similar emission points), while also considering the nature of substances that could be emitted from the new emission points. With regard to emissions from the scrubber, the current IPPC permit requires the implementation of a waste gas stream inventory (due by end December 2019) as well as an associated monitoring proposal (due by end June 2020); therefore the parameters to be monitored from the new scrubber might change in the future (in agreement with ERA) to incorporate the findings of this inventory.

Table 4.4: Proposed monitoring programme: emissions to air

Emission point reference	Parameters	Frequency
EM13 (scrubber)	VOC as carbon	Annually (provided limit values are met; otherwise every six months)
	Total particulate matter	
	Ammonia	
	HCl	
	HBr	
	VOCs having hazard statements H340, H350, H350i, H360D or H360F	Annual (if such substances are used, and at a mass flow ≥10 g/h); every six months if limit value is not met
	Halogenated VOCs having hazard statements H341 or H351	Annual (if such substances are used, and at a mass flow ≥10 g/h 100 g/h); every six months if limit value is not met
EM14 (HVAC system for line 7)	Total particulate matter	One-time monitoring (provided limits are met)
	Total VOC	
HVAC system for clean room line 7	Total particulate matter	One-time monitoring (provided limits are met)
EM16-EM20 (laboratory fume hoods)	Total VOC	One-time monitoring

4.41. Monitoring of emissions to air will be carried out using EN / ISO standards or equivalent; the standard method used may vary from time to time depending n the contractor engaged for this work. However, the methods used will be reported as part of the Annual Environmental Report.

4.42. Additionally, the current IPPC permit requires monitoring of Volatile Organic Compounds (VOC) in the head-space of the existing wash water reservoir on site. It is proposed that such monitoring would also start to be carried out for the new wash water reservoir and the spillage reservoir. Such monitoring will be carried out in-house, using a gas detector for explosive gases.

4.43. With regard to noise, the current IPPC permit requires the next noise monitoring session at Sterling Chemical to be carried out once the microniser is commissioned, with a monitoring proposal due by end April 2019. In view of the planned commissioning of the Scheme, it is proposed that next noise monitoring session would cover noise emissions from both the Scheme as well as the microniser, and that the deadline for a monitoring proposal would be extended to three months from issue of the varied permit. Monitoring will be carried out in accordance with the Terms of Reference stipulated in the IPPC permit.

5. IMPACT ON THE ENVIRONMENT

5.1. ERA's ToR require:

> ***C4.1 Environmental effects***
>
> *Provide an assessment of the potential significant environmental effects (including transboundary effects) of the foreseeable emissions from the proposal.*
>
> ***C4.2 Effects on other sites***
>
> *Provide an assessment of whether the proposal is likely to have a significant effect on another site in Malta and, if it is, provide an assessment of the implications of the installation for that site.*

5.2. As described in this Application, the potential emissions arising from the proposed variations are:

- Emissions to air; and
- Noise emissions.

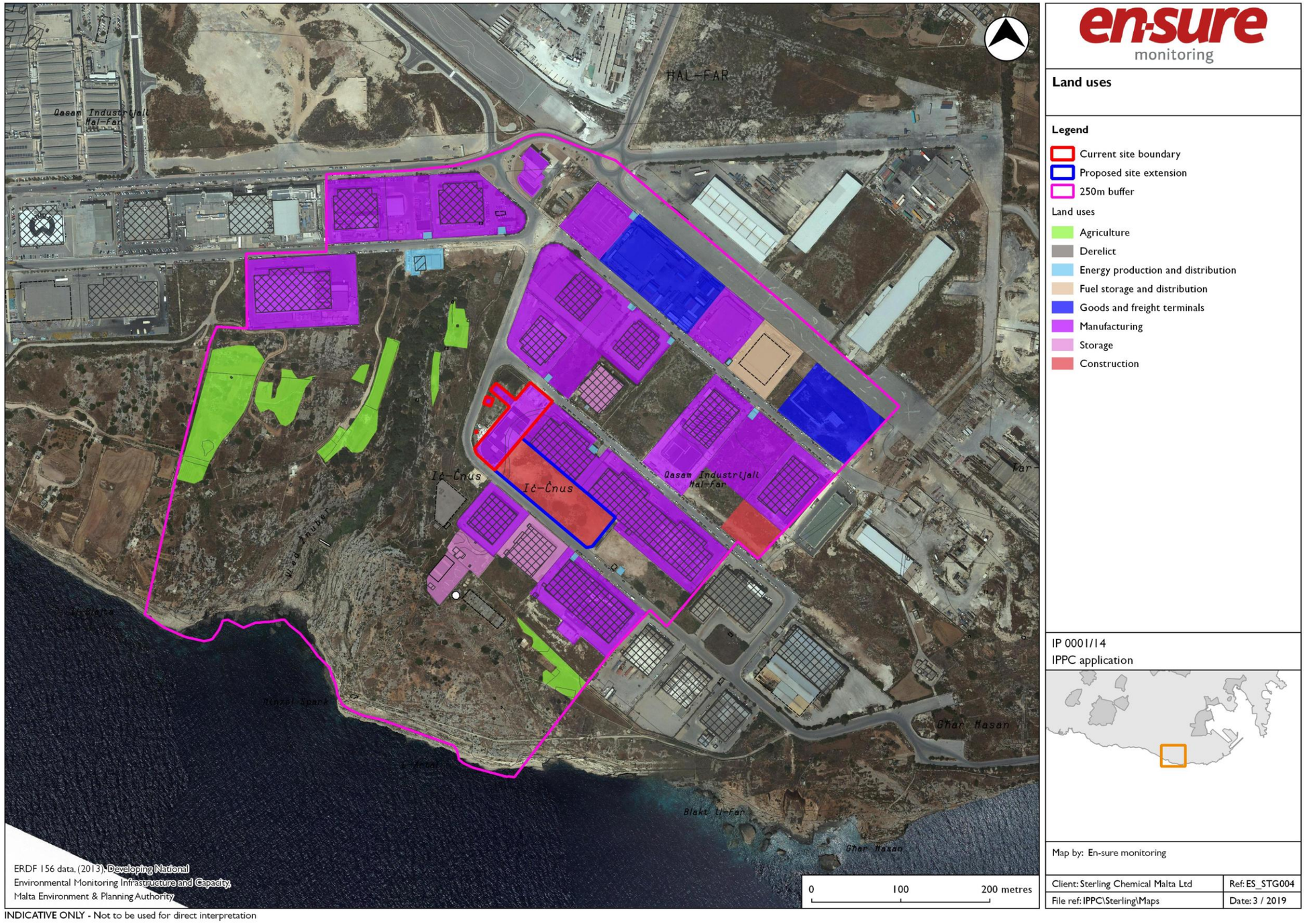
5.3. The surrounding land uses are mapped in **Figure 5.1**. The predominant land uses in the surrounding area are industrial, predominantly manufacturing activities (including pharmaceutical production, detergent manufacture, production of climate control systems, and printing presses) and storage / warehousing. Some cultivated agricultural land is found along both sides of the Wied Żnuber valley, located to the west of the Scheme site. There are no residential properties within 250 m of the Scheme site.

5.4. Emissions to air from the proposed variations are described in section C3.6 of this application. As mentioned, air emissions will be mitigated, including through the use of a new scrubber for the new pilot reactors. Therefore the environmental impacts of air emissions from the Scheme are expected to be low.

5.5. Noise emissions are described in section C3.9 of this application. Such emissions will arise from new utilities. Since the noise generated is from equipment similar to that already installed at the facility, and the site is located in an industrial area surrounded by existing industrial uses (and some distance away from sensitive receptors), impacts on noise sensitive receptors are not expected. Additionally, several of the equipment will be located indoors.

5.6. As noted in the IPPC application form (**Volume 1**), no emissions to land and groundwater are proposed. The addendum to the Land and Groundwater Risk Assessment (**Volume 3**), identifies the risks to land and groundwater as ranging from none (where there is no pollutant linkage) to low and very low.

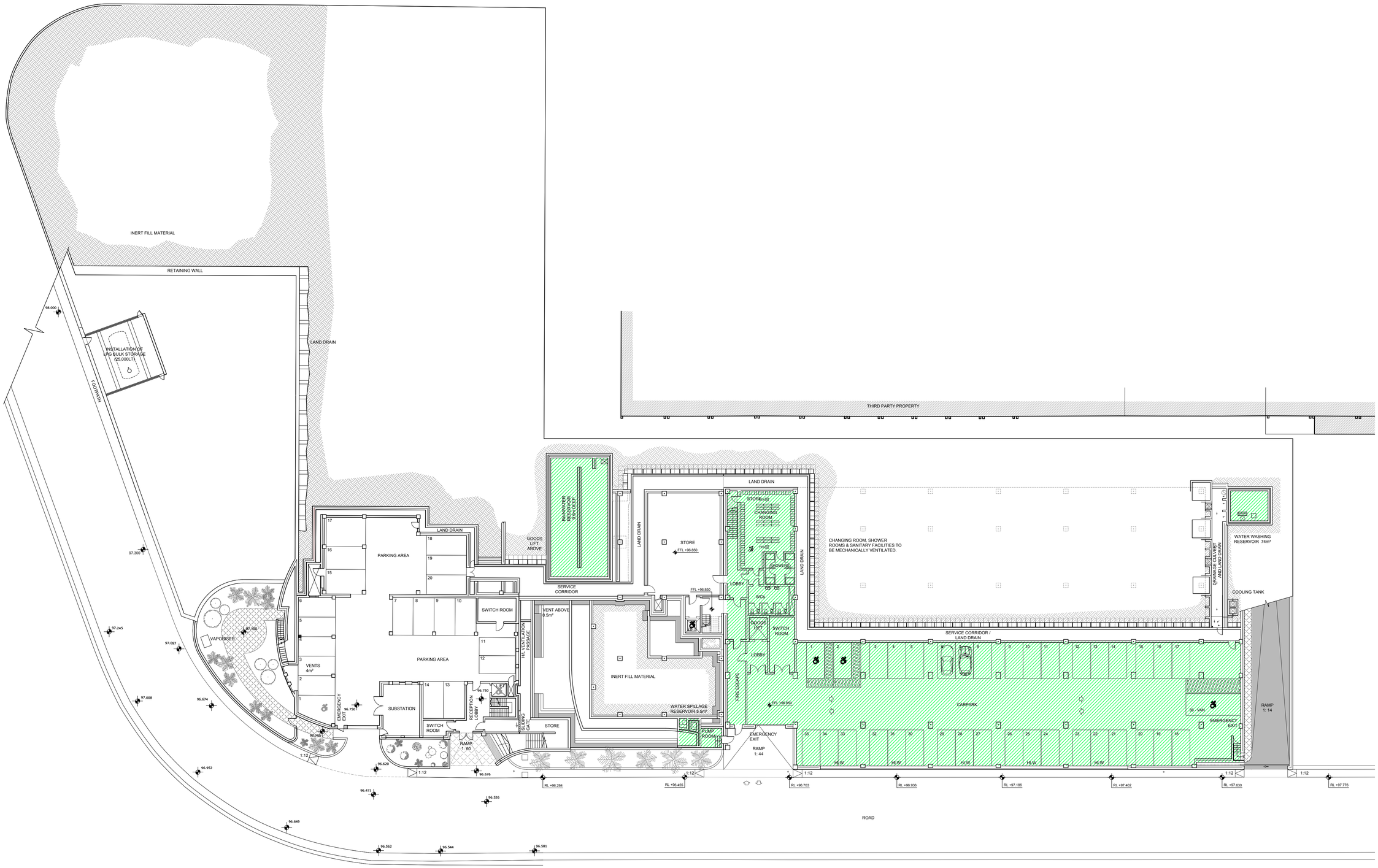
Figure 5.1: Surrounding land uses



ERDF 156 data, (2013), Developing National Environmental Monitoring Infrastructure and Capacity, Malta Environment & Planning Authority

INDICATIVE ONLY - Not to be used for direct interpretation

Annex 1: Scheme drawings



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Rev.	Drawn	Description	Date

Wallace Farrugia & Associates
Architects, Civil Engineers & Structural Consultants.
No 44, Appt 3, St.Francis Street, Sliema SLM2069 tel:21316758 fax: 21316760

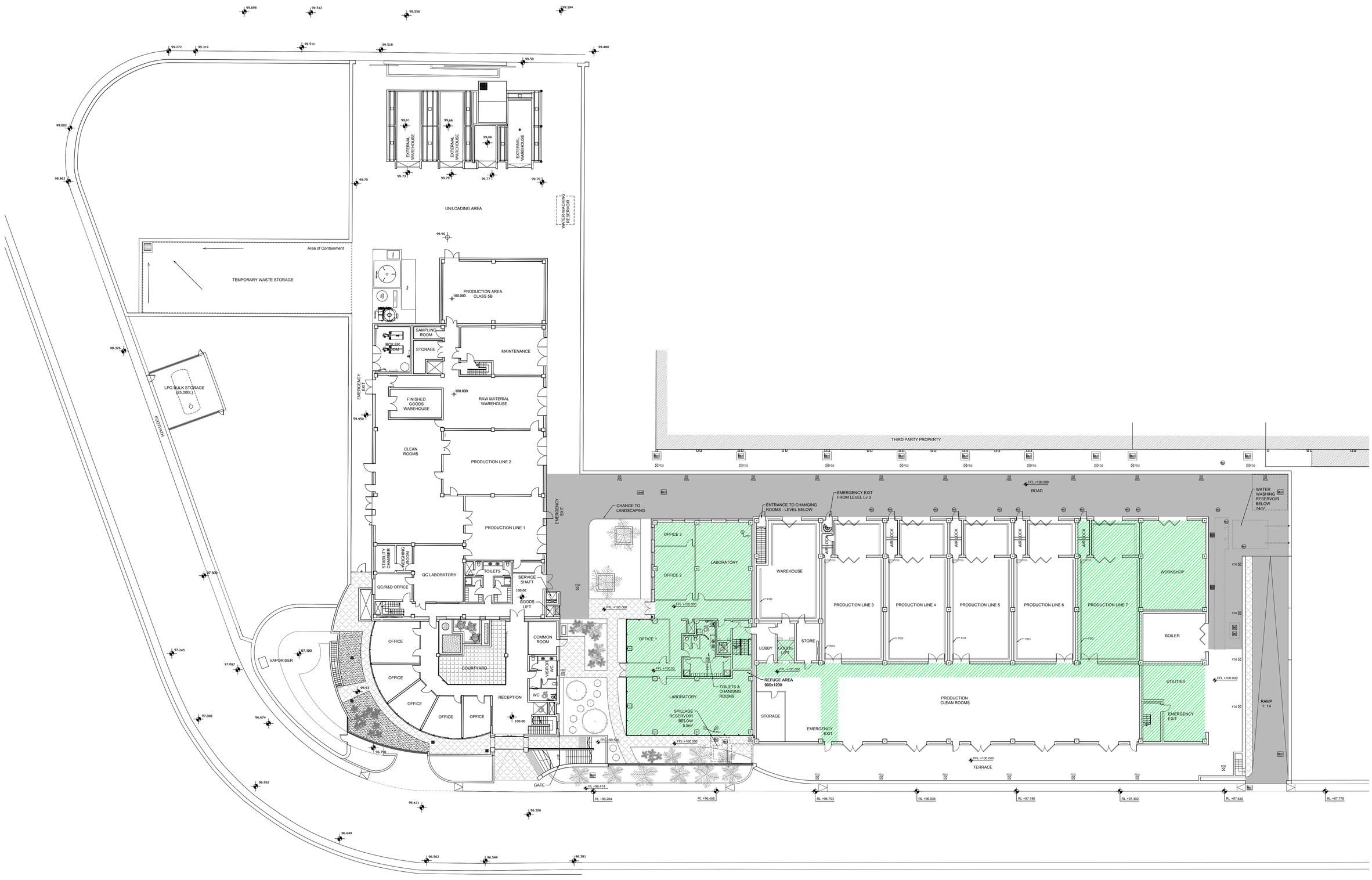
Commission:
FACTORY HF53
AT HAL-FAR

Client:
STERLING CHEMICALS LTD.

Drawing Title:
PLAN LEVEL 0

Scale:	Drawing No:
1:250	190-16-091
Job Ref:	**Paper Size:**
190/16	A1

Drawn:	Amended:	Approved:	Checked:	Date:
DMG	-	-	W.F.	22.02.2019



Rev.	Drawn	Description	Date
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-	-	-	-
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Wallace Farrugia & Associates
Architects, Civil Engineers & Structural Consultants.
No 44, Appt 3, St.Francis Street, Sliema SLM2069 tel:21316758 fax: 21316760

Commission:
FACTORY HF53
AT HAL-FAR

Client:
STERLING CHEMICALS LTD.

Drawing Title:
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Scale:	Drawing No:
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Drawn:	Amended:	Approved:	Checked:	Date:
DMG	-	-	W.F.	22.02.2019

Rev.	Drawn	Description	Date
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-	-	-	-
-	-	-	-

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Commission:
FACTORY HF53
AT HAL-FAR

Client:
STERLING CHEMICALS LTD.

Drawing Title:
PLAN LEVEL 2

Scale:	Drawing No:
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Job Ref:	**Paper Size:**
190/16	A2

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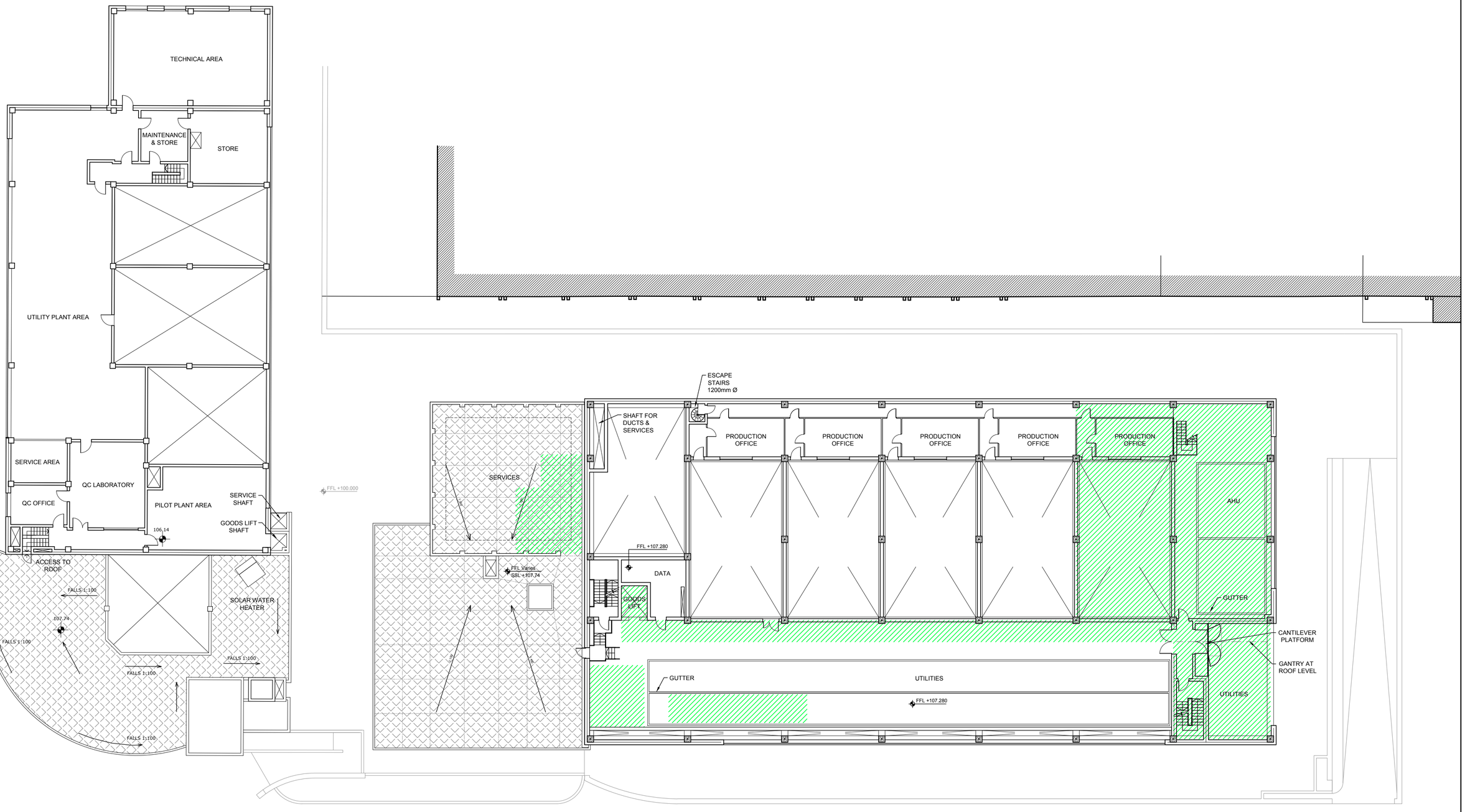

Rev.	Drawn	Description	Date
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-	-	-	-

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Commission:
FACTORY HF53
AT HAL-FAR

Client:
STERLING CHEMICALS LTD.

Drawing Title:
PLAN LEVEL 3

Scale:	Drawing No:
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Job Ref: 190/16	Paper Size: A2

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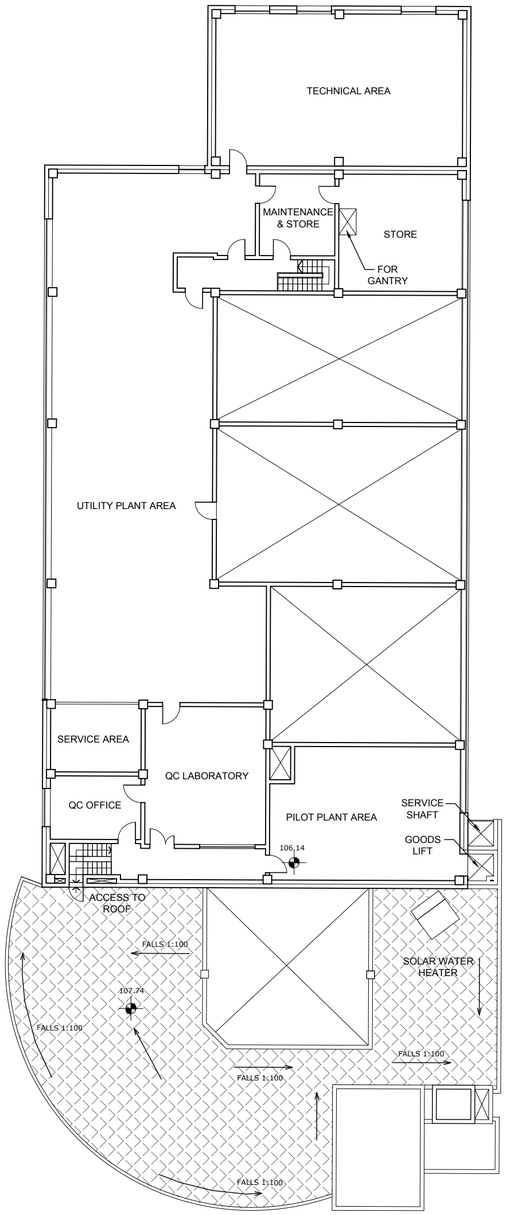
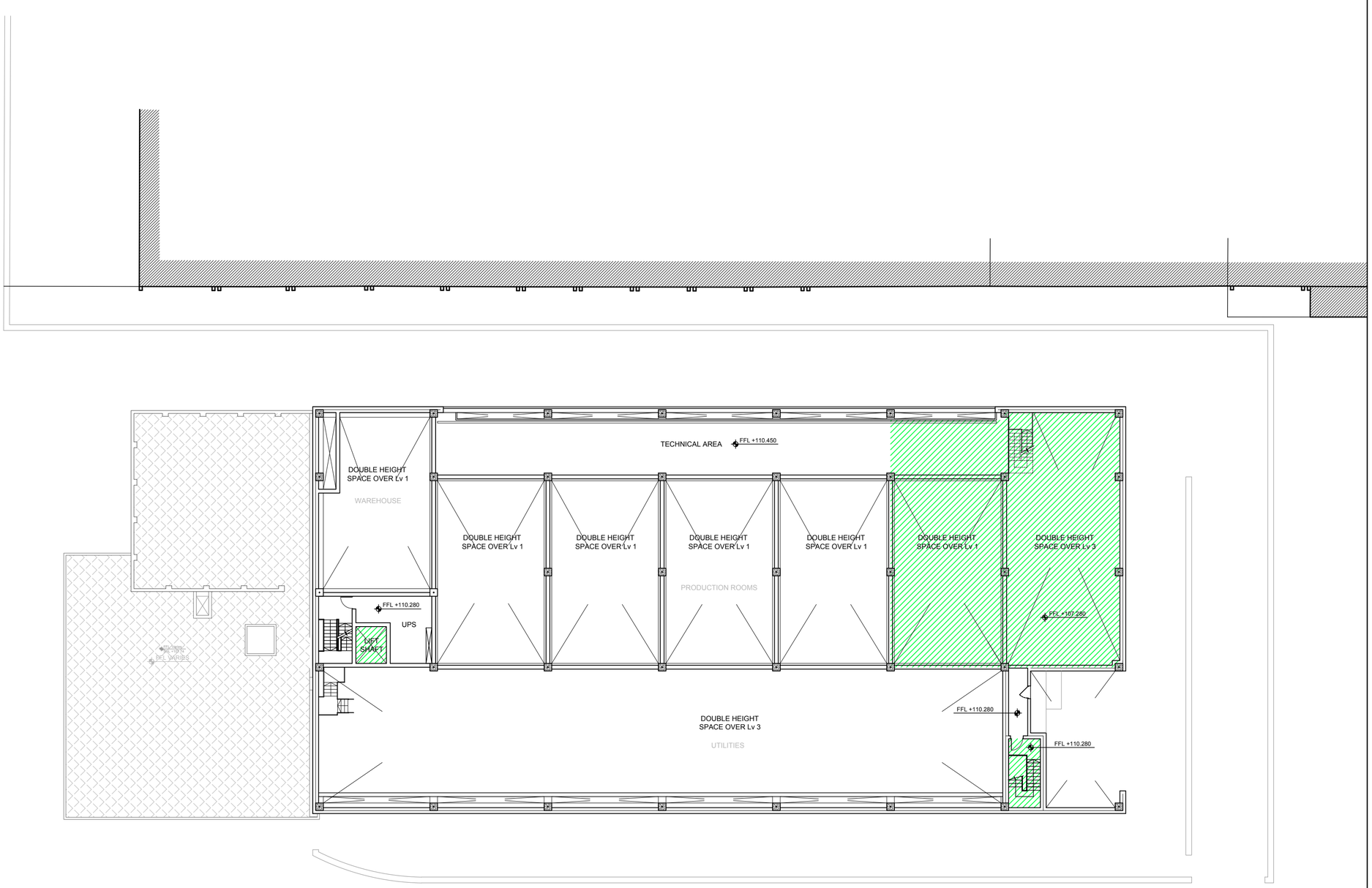
DMG	-	-	W.F.	22.02.2019





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-	-	-	-

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Architects, Civil Engineers & Structural Consultants.
No 44, Appt 3, St.Francis Street, Sliema SLM2069 tel:21316758 fax: 21316760

Commission:
FACTORY HF53
AT HAL-FAR

Client:
STERLING CHEMICALS LTD.

Drawing Title:
PLAN LEVEL 3 INTERMEDIATE

Scale:	Drawing No:
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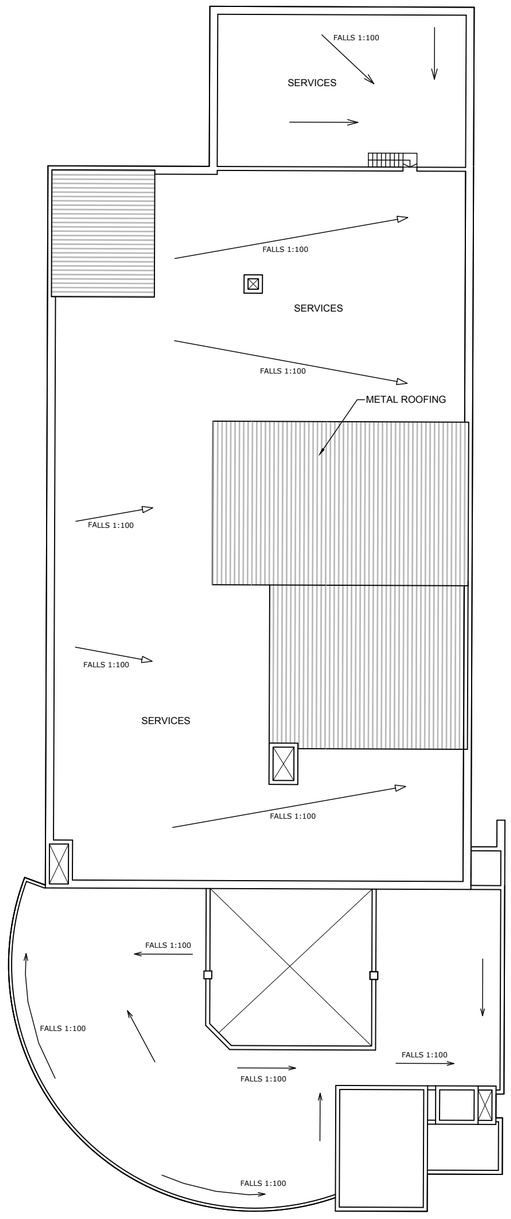

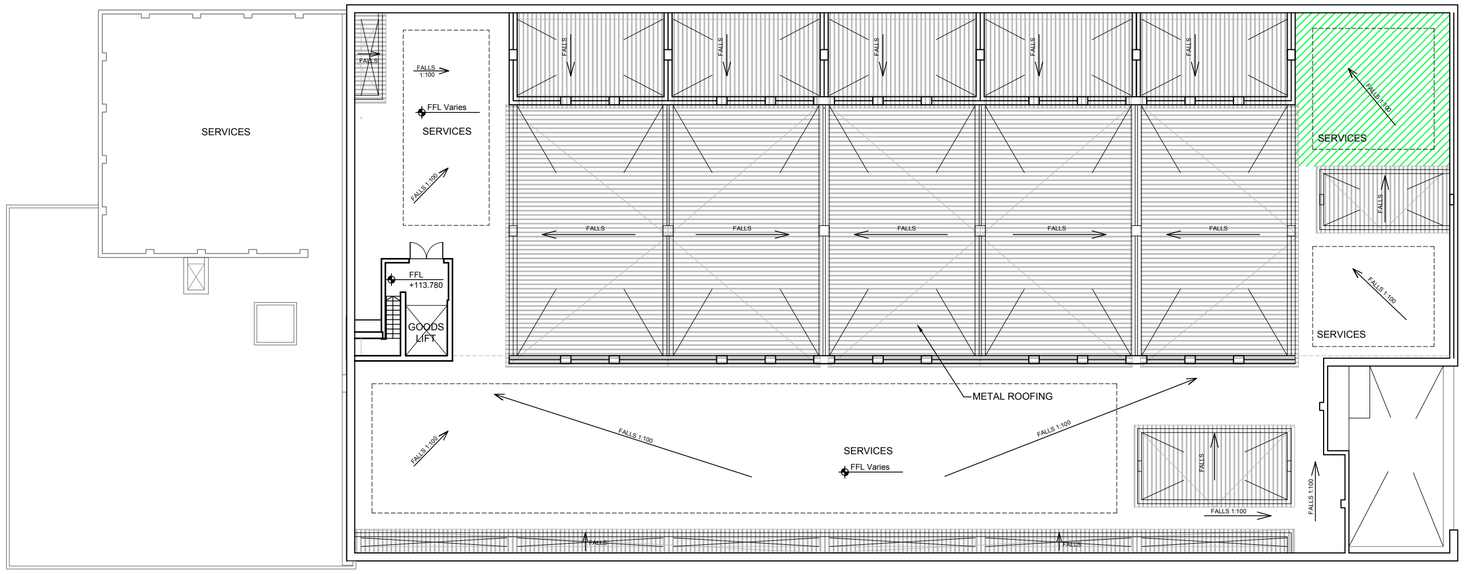

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-	-	-	-

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Commission:
FACTORY HF53
AT HAL-FAR

Client:
STERLING CHEMICALS LTD.

Drawing Title:
PLAN LEVEL 4 ROOF

Scale:	Drawing No:
1:250	190-16-096
Job Ref: 190/16	Paper Size: A2

Drawn:	Amended:	Approved:	Checked:	Date:
DMG	-	-	W.F.	22.02.2019

LEGEND

- Sanitary Water Drainage (PVC)
- Rainwater to reservoir (PVC)
- Rainwater to street (PVC)
- Process Drainage (HDPE) Pipe 50 / 110mmØ
- Process Drainage Channel Floor Gutter

IL.96.30 Invert Level
FD Floor Drain
IC Interceptor Chamber
RP Rodding Point
IP Inspection Point
NRV HDPE Non-return valve
HDPE ball valve
HDPE ball valve (sampling)
V HDPE ball valve accessed via manhole
HDPE manhole (sampling)

MANHOLE LEGEND

Manhole Cover Sizes - cast iron:

MH6 600 X 600mm
MH1 MH4 600 X 900mm
MH2 MH3 MH5 600Ømm

Manhole Cover Loadings:

B125 - MH6
C250 - MH1, MH4
D400 - MH2, MH3, MH5

FLOOR DRAIN LEGEND

FLOOR DRAIN TYPES:

FD1 200 x 200mm STAINLESS STEEL FLOOR DRAIN WITH FLOOR PLATE - PROCESS DRAINAGE -

FD2 200 x 200mm CAST IRON GULLEY FLOOR DRAIN WITH GRATING - RAINWATER RUNOFF -

FD3 **ACO BOX 125 STAINLESS STEEL** FLOOR GUTTER WITH 'GRIGLIA ANTITACCO' / 'GRIGLIA A BARRE' - PROCESS DRAINAGE -

FD4 **ULMA LINEAR DRAINAGE CHANNEL U100K** INTERNAL WIDTH 100MM, 150MM MAX. DEPTH, INTEGRATED GALV. STEEL EDGES, DUCTIL IRON SLOTTED GRATING LOADING GRADE C250

FD5 **ULMA LINEAR DRAINAGE CHANNEL M100K** INTERNAL WIDTH 100MM, 80MM MAX. HEIGHT, INTEGRATED GALV. STEEL EDGES, GALV. STEEL MESH GRATING LOADING GRADE B125

FD6 150mm X 150mm STAINLESS STEEL FLOOR DRAIN WITH FLOOR PLATE

Scale 1:200

Rev.	Description	Date
-	-	-

Wallace Farrugia & Associates
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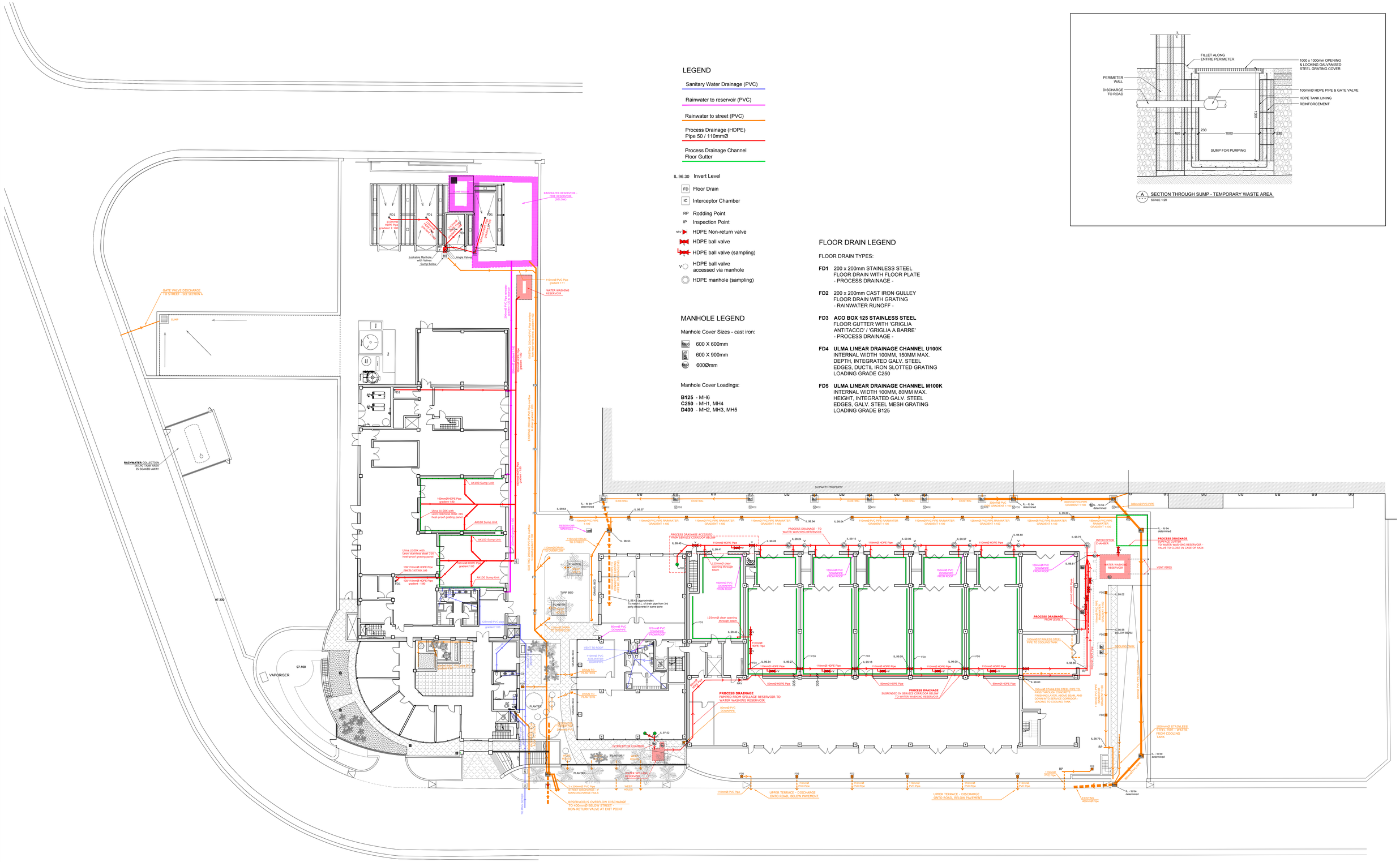
No 44, Appt 3, St.Francis Street, Sliema SLM1069 tel:21316758 fax: 21316760

Commission: FACTORY HF50, HF51, HF52, HF53 AT MAL-FAR
Drawing Title: DRAINAGE LAYOUT LEVEL 0
Client: STERLING CHEMICALS LTD.
Scale: 1:200
Drawing No: 190-16-097
Job Ref: 190/16
Paper Size: A0

Drawn:	Amended:	Approved:	Checked:	Date:
D.M.G.	" "	" "	W.F.	22.06.2018



LEGEND

- Sanitary Water Drainage (PVC)
- Rainwater to reservoir (PVC)
- Rainwater to street (PVC)
- Process Drainage (HDPE) Pipe 50 / 110mmØ
- Process Drainage Channel Floor Gutter

IL.96.30 Invert Level

FD Floor Drain

IC Interceptor Chamber

RP Rodding Point

IP Inspection Point

NRV HDPE Non-return valve

HDPE ball valve

HDPE ball valve (sampling)

V HDPE ball valve accessed via manhole

HDPE manhole (sampling)

MANHOLE LEGEND

Manhole Cover Sizes - cast iron:

MH1 600 X 600mm

MH2 600 X 900mm

MH3 600Ømm

Manhole Cover Loadings:

B125 - MH6
C250 - MH1, MH4
D400 - MH2, MH3, MH5

FLOOR DRAIN LEGEND

FLOOR DRAIN TYPES:

FD1 200 x 200mm STAINLESS STEEL FLOOR DRAIN WITH FLOOR PLATE - PROCESS DRAINAGE -

FD2 200 x 200mm CAST IRON GULLEY FLOOR DRAIN WITH GRATING - RAINWATER RUNOFF -

FD3 **ACO BOX 125 STAINLESS STEEL** FLOOR GUTTER WITH 'GRIGLIA ANTITACCO' / 'GRIGLIA A BARRE' - PROCESS DRAINAGE -

FD4 **ULMA LINEAR DRAINAGE CHANNEL U100K** INTERNAL WIDTH 100MM, 150MM MAX. DEPTH, INTEGRATED GALV. STEEL EDGES, DUCTIL IRON SLOTTED GRATING LOADING GRADE C250

FD5 **ULMA LINEAR DRAINAGE CHANNEL M100K** INTERNAL WIDTH 100MM, 80MM MAX. HEIGHT, INTEGRATED GALV. STEEL EDGES, GALV. STEEL MESH GRATING LOADING GRADE B125

A SECTION THROUGH SUMP - TEMPORARY WASTE AREA
SCALE 1:20

Rev.	Description	Date
-	-	-

Wallace Farrugia & Associates
Architects, Civil Engineers & Structural Consultants.
No 44, Appt 3, St.Francis Street, Sliema SLM2069 tel:21316758 fax: 21316760

Commission: FACTORY HF50, HF51, HF52, HF53 AT MAL-FAR

Drawing Title: DRAINAGE LAYOUT LEVEL 1

Client: STERLING CHEMICALS LTD.

Scale: 1:200

Drawing No: 190-16-098

Job Ref: 190/16

Paper Size: A0

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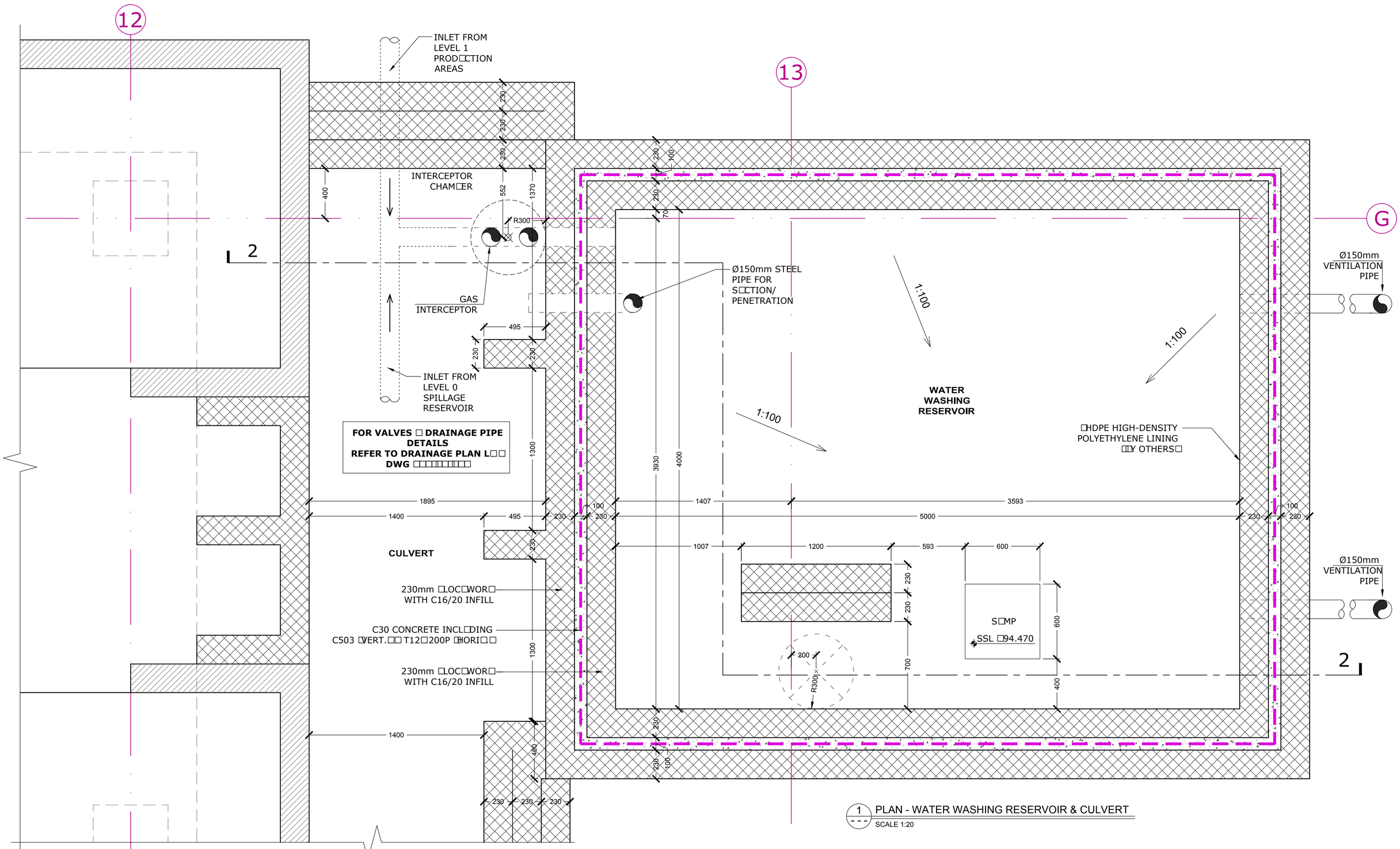
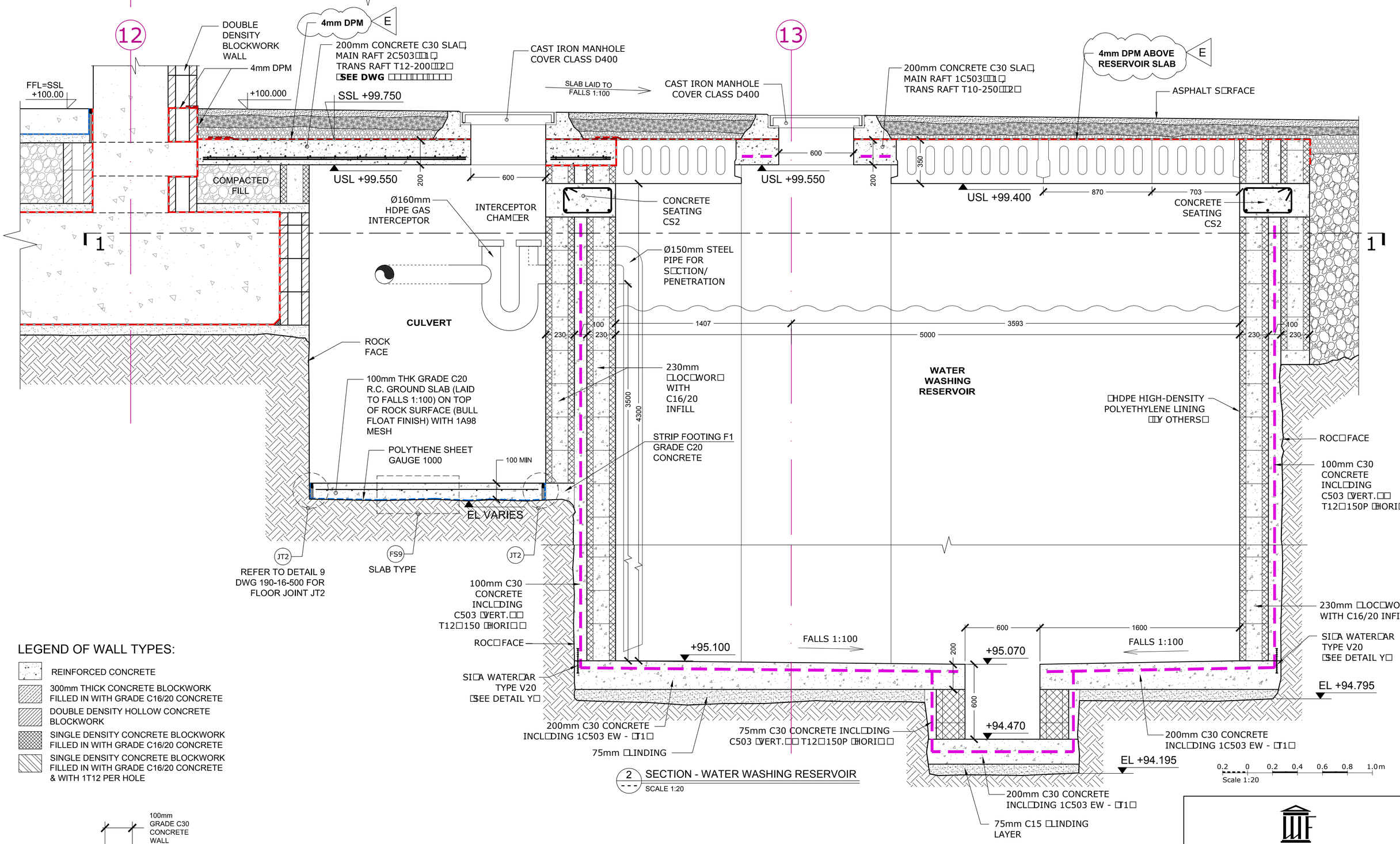
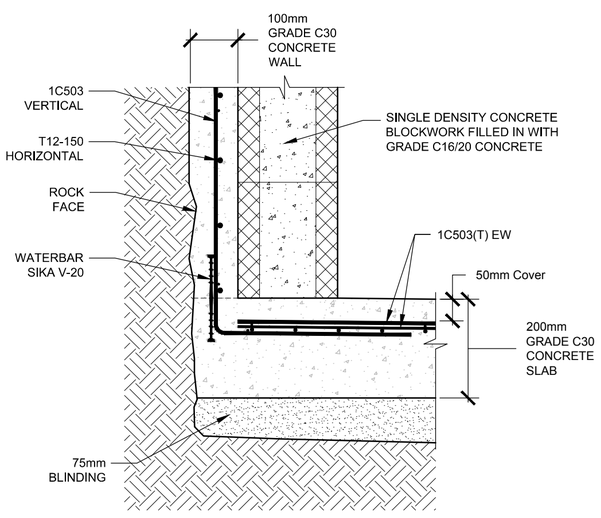
D.M.G.	- -	- -	W.F.	22.02.2019



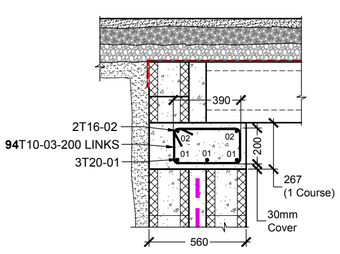


LEGEND OF WALL TYPES:

- REINFORCED CONCRETE
- 300mm THICK CONCRETE BLOCKWORK FILLED IN WITH GRADE C16/20 CONCRETE
- DOUBLE DENSITY HOLLOW CONCRETE BLOCKWORK
- SINGLE DENSITY CONCRETE BLOCKWORK FILLED IN WITH GRADE C16/20 CONCRETE
- SINGLE DENSITY CONCRETE BLOCKWORK FILLED IN WITH GRADE C16/20 CONCRETE & WITH 1T12 PER HOLE



DETAIL SHOWING WATERBAR
SCALE 1:10



SECTION CS2
SCALE 1:25

PRECAST PRESTRESSED HOLLOW CORE SLAB TYPES			
PLANK REFERENCE	SAFE SUPERIMPOSED LOAD (kg/m²)	MAX. CLEAR SPAN (m)	APPROXIMATE THICKNESS OF PLANK (mm)
PS6	5100	4.750	350

NOTE: CONCRETE FLOOR SLAB, CONCRETE AGAINST ROCK WALL AND BETWEEN BLOCK WALLS (GRADE C30) TO INCLUDE PLASTOCRETE N ADDITIVE

NB: FOR **INVERT LEVELS** REFER TO DRAINAGE PLAN DWG 190-16-150

NOTES

1. DO NOT SCALE OFF THE DRAWING.
2. ALL DIMENSIONS IN MILLIMETRES.
3. LEVELS ARE IN METRES.
4. ALL DIMENSIONS ARE GIVEN FOR GUIDANCE ONLY. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE ACTUAL LENGTHS ON SITE.
5. ABBREVIATIONS:
   F.F.L. FINISHED FLOOR LEVEL
   S.S.L. STRUCTURAL SLAB LEVEL
   U.S.L. UNDERSIDE SLAB LEVEL
6. **IN CASE OF VARYING PRESTRESSED SLAB THICKNESS, SECTION DRAWINGS AND BEAM DETAILS ARE TO BE ADJUSTED ACCORDINGLY.**
7. UNLESS OTHERWISE SPECIFIED, COVER TO REINFORCEMENT TO BE 50**mm** IN RESERVOIR SLABS & WALLS

Rev.	Drawn	Description	Date
E	C.	REMOVED POLYTHENE SHEETS & REPLACED WITH 4mm DPM ABOVE RESERVOIR & CULVERT	03.09.2018
D	D.M.G.	AMENDED VENT PIPES	02.08.2018
C	D.M.G. /C.	SHIFTED LOCATION OF MANHOLE, SUMP & RESERVOIR AND ADDED CULVERT	18.07.2018
	C.	AMENDED SIZE OF LINTEL IN CS2	05.02.2018
A	C.	ISSUED FOR CONSTRUCTION	21.02.2018

Wallace Farrugia & Associates
Architects, Civil Engineers & Structural Consultants.
No 44, Appt 3, St.Francis Street, Sliema SLM2069 tel:21316758 fax: 21316760

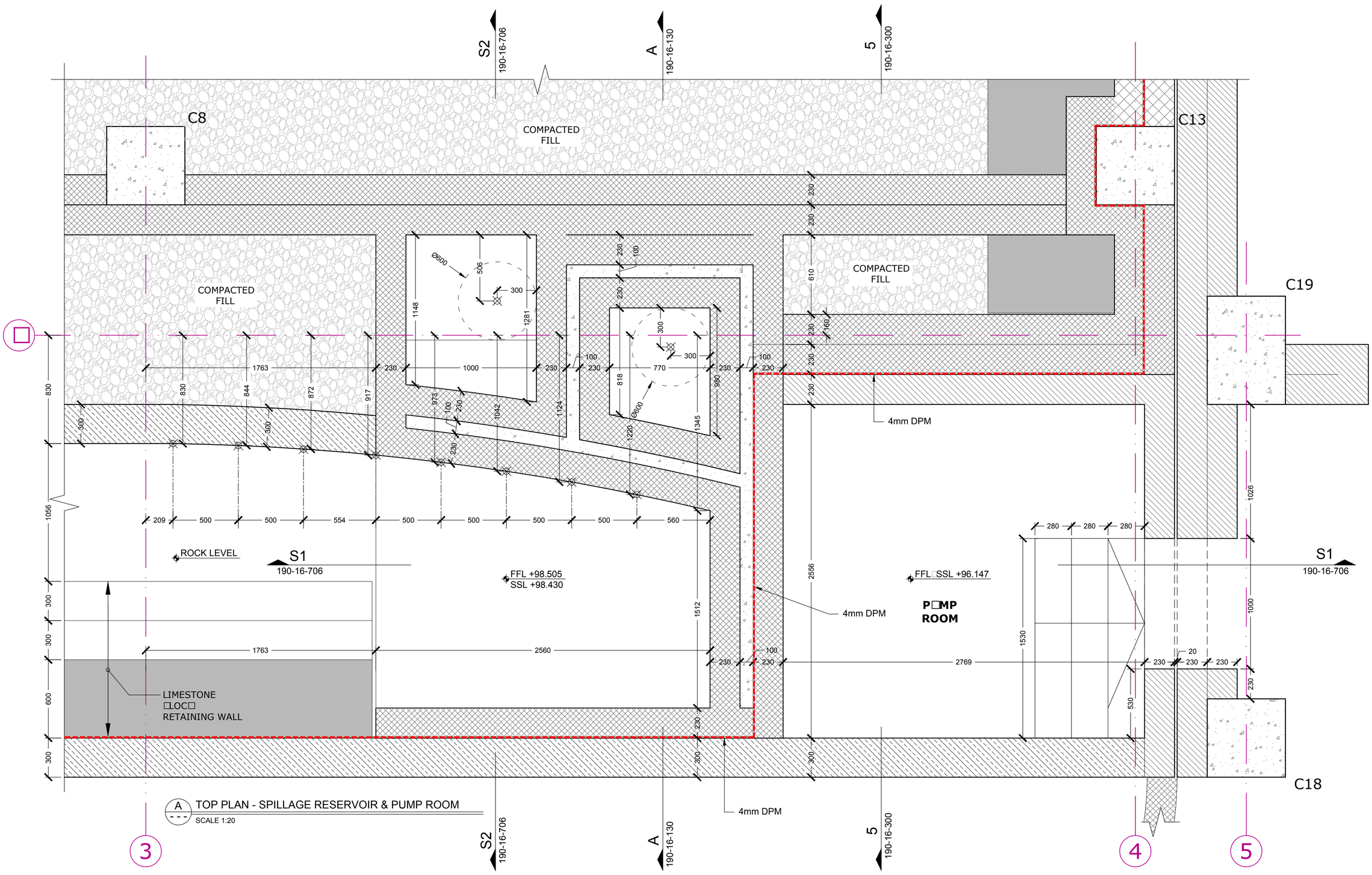
Commission:
FACTORY HF53
AT HAL-FAR

Client:
STERLING CHEMICALS LTD.

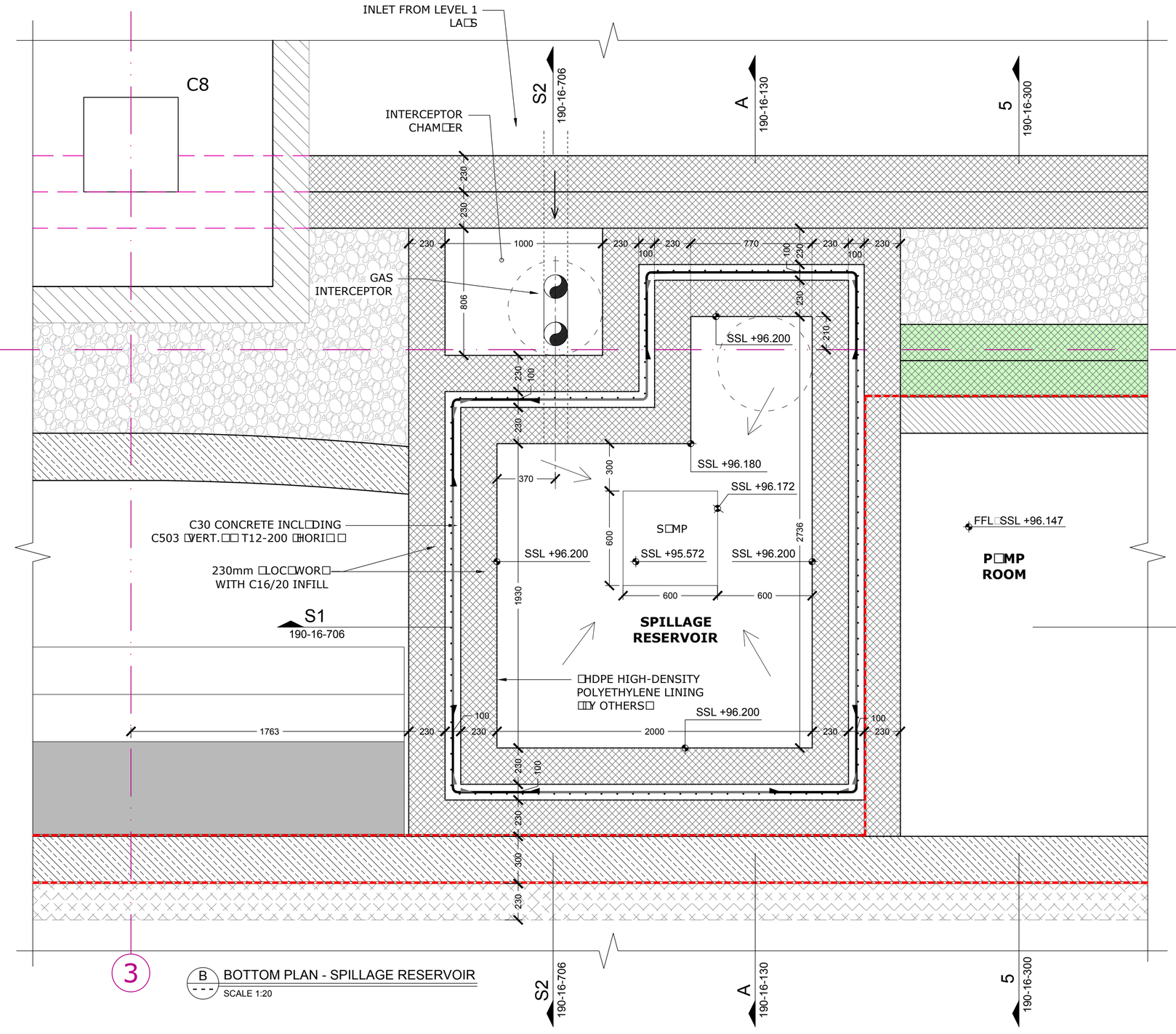
Drawing Title:
WATER WASHING RESERVOIR

Scale:	Drawing No:
Various	190-16-700 Rev E
Job Ref: 190/16	Paper Size: A1

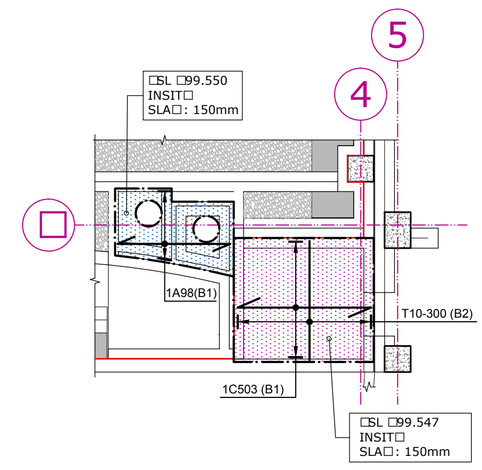
Drawn:	Amended:	Approved:	Checked:	Date:
DMG	-	-	W.F.	29.09.2017



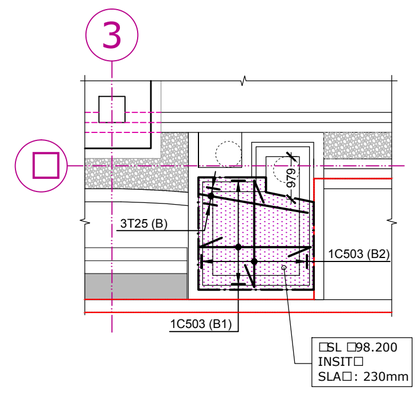
A TOP PLAN - SPILLAGE RESERVOIR & PUMP ROOM
SCALE 1:20



B BOTTOM PLAN - SPILLAGE RESERVOIR
SCALE 1:20



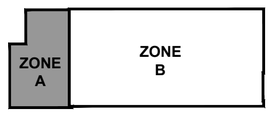
C TOP SLAB ABOVE RESERVOIR & SLAB OVER PUMP ROOM
SCALE 1:100



D BOTTOM SLAB ABOVE RESERVOIR
SCALE 1:100

DRAWING TO BE READ IN CONJUCTION WITH:
190-16-130 - SEE SECTION A
190-16-706 - SECTIONS S1 & S2
190-16-300 - SECTION 5

KEY PLAN



NB: FOR INVERT LEVELS REFER TO DRAINAGE PLAN DWG 190-16-150

NOTES

1. DO NOT SCALE OFF THE DRAWING.
2. ALL DIMENSIONS IN MILLIMETRES.
3. LEVELS ARE IN METRES.
4. ALL DIMENSIONS ARE GIVEN FOR GUIDANCE ONLY. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE ACTUAL LENGTHS ON SITE.
5. ABBREVIATIONS:
   F.F.L. FINISHED FLOOR LEVEL
   S.S.L. STRUCTURAL SLAB LEVEL
   U.S.L. UNDERSIDE SLAB LEVEL
6. STRUCTURAL CONCRETE IN BEAMS, LINTELS, COLUMNS, FOUNDATIONS ETC. TO BE CAST IN GRADE C30 CONCRETE.
7. UNLESS OTHERWISE SPECIFIED, COVER TO REINFORCEMENT TO BE 50**mm** IN RESERVOIR SLABS & WALLS

Rev.	Drawn	Description	Date
E	C.	GENERAL AMENDMENTS	26.11.2018
D	C.	PDATED FLOOR TYPE & ADDED	03.09.2018
		4mm DPM ADVE RESERVOIR SLA	
C	C.	LOWERED STAIRCASE WALL	02.08.2018
	C.	LOWERED LINTELS L1	09.05.2018
A	C.	ISSED FOR CONSTRCTION	06.03.2018

Wallace Farrugia & Associates
Architects, Civil Engineers & Structural Consultants.
No 44, Appt 3, St.Francis Street, Sliema SLM2069 tel:21316758 fax: 21316760

Commission: FACTORY HF53 AT HAL-FAR

Client: STERLING CHEMICALS LTD.

Drawing Title: SPILLAGE RESERVOIR & PUMP ROOM - PLANS

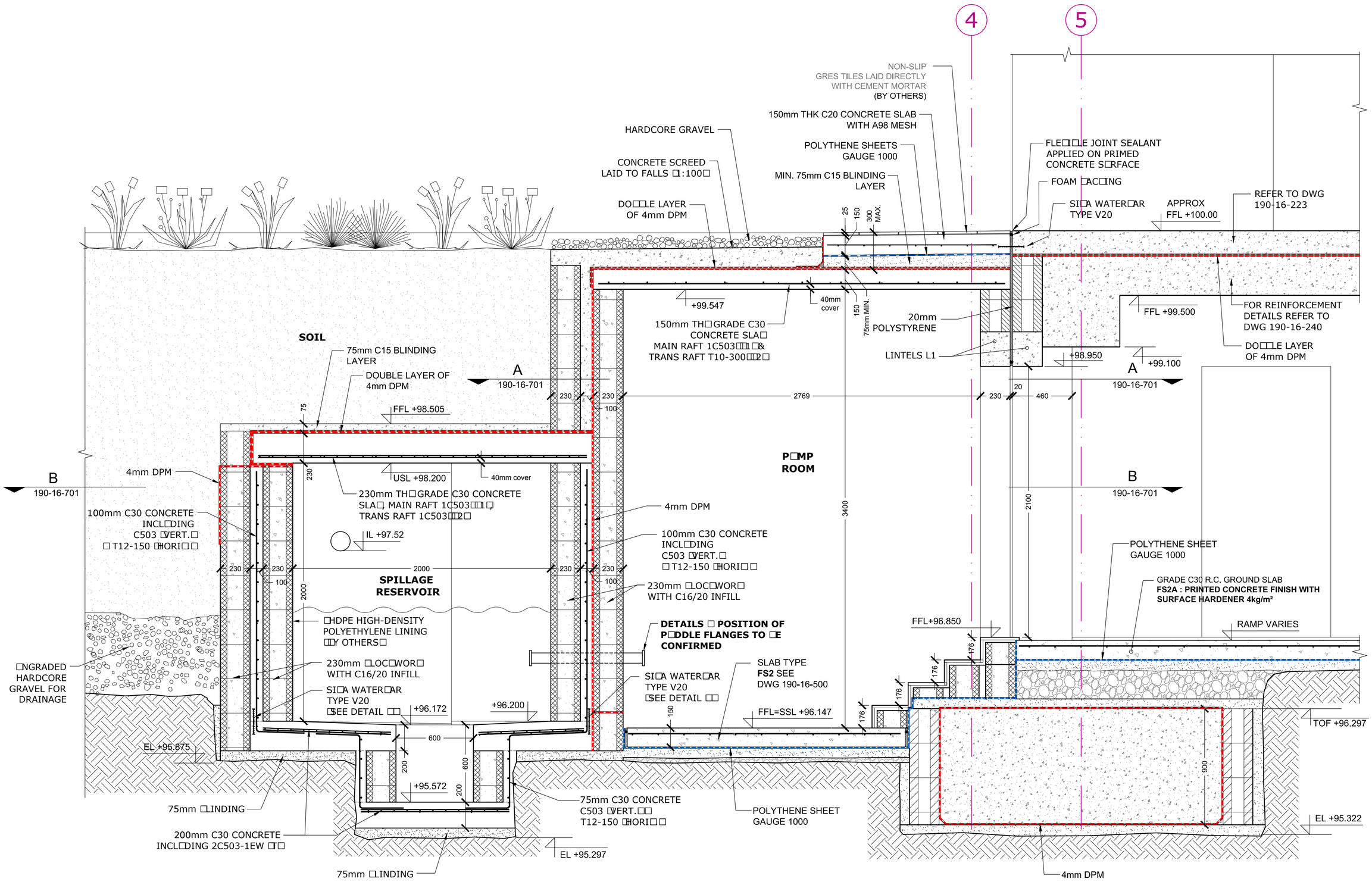
Scale: 1:20, 1:100

Drawing No: 190-16-701 Rev E

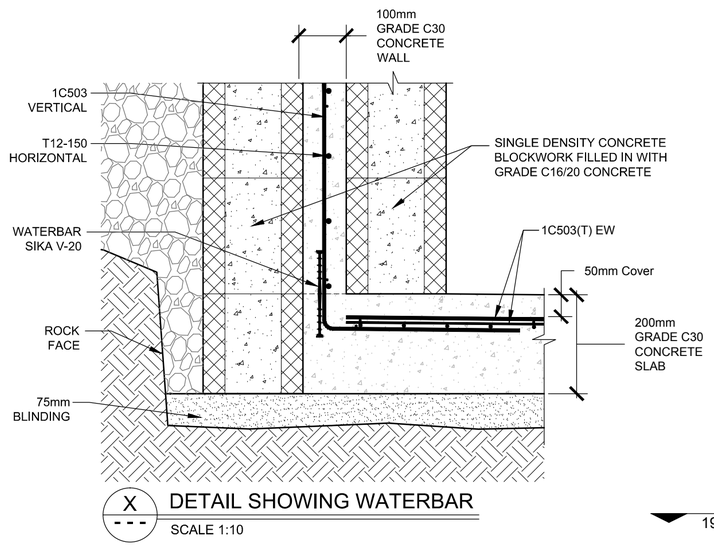
Job Ref: 190/16

Paper Size: A1

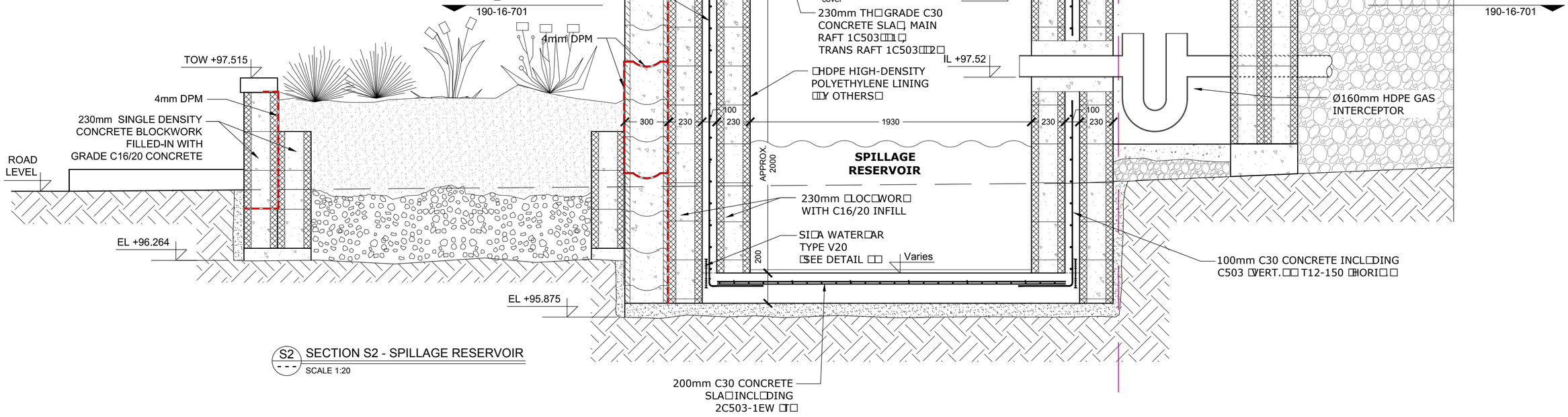
Drawn:	Amended:	Approved:	Checked:	Date:
D.M.G	- -	- -	W.F.	26.09.2017



S1 SECTION S1 - SPILLAGE RESERVOIR & PUMP ROOM
SCALE 1:20



X DETAIL SHOWING WATERBAR
SCALE 1:10



S2 SECTION S2 - SPILLAGE RESERVOIR
SCALE 1:20

NOTES

1. DO NOT SCALE OFF THE DRAWING.
2. ALL DIMENSIONS IN MILLIMETRES.
3. LEVELS ARE IN METRES.
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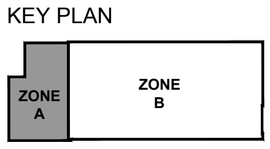
6. STRUCTURAL CONCRETE IN BEAMS, LINTELS, COLUMNS, FOUNDATIONS ETC. TO BE CAST IN GRADE C30 CONCRETE.
7. UNLESS OTHERWISE SPECIFIED, COVER TO REINFORCEMENT TO BE 50**mm** IN RESERVOIR SLABS & WALLS

NB: FOR INVERT LEVELS REFER TO DRAINAGE PLAN DWG 190-16-150

KEY PLAN



Rev.	Drawn	Description	Date
-	-	-	-

Wallace Farrugia & Associates
Architects, Civil Engineers & Structural Consultants.
No 44, Appt 3, St.Francis Street, Sliema SLM2069 tel:21316758 fax: 21316760

Commission: FACTORY HF53 AT HAL-FAR

Drawing Title: SPILLAGE RESERVOIR & PUMP ROOM - SECTIONS

Job Ref: 190/16

Paper Size: A1

Drawn:	Amended:	Approved:	Checked:	Date:
D.M.G	- -	- -	W.F.	26.11.2018

Client: STERLING CHEMICALS LTD.

Scale: 1:20, 1:10

Drawing No: 190-16-706

en-sure monitoring

Annex 2: Fire safety and ventilation report

CAMILLERI CONSULTING ENGINEERS CUSCHIERI

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Consulting Engineers

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e-mail: info@camilleriandcuschieri.com
website: www.camilleriandcuschieri.com

VAT Reg. No: MT1043 6416

Mr Damian Whitehead
o.b.o. Malta Industrial Parks Ltd.

1st June 2017

Fire Safety, and Ventilation Report for Factory HF53 in Hal Far

With reference to the proposed project and the attached plans as received from the architects, please find the following fire safety and ventilation report for your perusal.

(A) Fire Safety

BS9999:2008 classifies Offices and Industrial Premises under Occupancy Characteristic type A, where the purpose group is described as Occupants who are awake and familiar with the building. The Overall Risk Profile shall be A3, estimating a fast fire growth rate. Given the building height, all elements of the structure must have a fire resistance of at least 90minutes.

1 Fire Fighting Measures

The fire fighting installation shall be comprised of a sprinkler system as indicated in the drawings. On the other hand, production areas shall be provided with Sodium bicarbonate type extinguishers.

The fire fighting installation shall also entail a wet mains system. Fire extinguishers shall also be installed in selected areas throughout the building.

Both the sprinkler system and the wet mains system draw water from a dedicated water reserve.

The system shall be designed and certified in accordance with international recommendations.

1.1 Fire cabinets

The premises shall be furnished with fire cabinets which shall contain fire extinguishers and a fire blanket. The cabinets shall be red in colour and shall have FIRE POINT together with a pictogram clearly displayed on them.

1.2 Fire extinguishers.

The fire extinguishers shall be of various types including:

- Dry powder type which are suitable for all types of fires including:
  - Type A (Paper, wood, textile, fabric)
  - Type B (Flammable liquids)
  - Type C (Flammable gases)
  - Electrical hazards
- AFFF type which are very effective on many classes of fires but is not recommended for use on electrical fires;
- CO2 type which are effective on electrical fires.

1.3 Fire blankets

The fire blankets are particularly suited for the extinguishing of fires in their early stages by smothering the flames.

1.4 Wet Mains system

The wet mains shall be comprised from a series of landing valves and hose reels at each level, a breech point inlet for tank refill connected together via a network of galvanised pipes.

These shall be connected to the existing fire pump.

1.5 Fire-Fighting Staircases

The building shall be furnished with two fire-fighting staircases as per requirements satisfying BS9999 of 2008.

The fire-fighting stairwell shall be adjacent to the outside or situated in a fire protected corridor that is 1.5m wide and no longer than 18m in length from the outside. The corridor is deemed to be part of the fire-fighting shaft, and any access to it should be by way of a protected lobby. The fire-fighting staircase and fire-fighting lobby shall be separated by a fire door as can be seen in the drawings.

The fire-fighting lobby shall house the fire mains and landing valves.

Following the above provisions, it can be concluded that the fire-fighting lobbies shall be in line with BS9999.

1.6 Conclusion

From the above, it may be observed that the building shall be furnished with adequate fire fighting measures.

2 Fire Detection System

According to BS9999 of 2008, an Automatic Fire Detection System to cover areas as defined by category L2 within BS5839 shall be required. As a result, areas and levels of the building shall be furnished with a fire detection installation comprising of a fire alarm monitoring panel, rate of rise heat detectors, smoke detectors, manual call points and fire alarm sounders as may be required.

2.1 Fire alarm panel

The fire alarm panel shall have clear zoning indications such that in the event of a fire, the location of the detector triggered can easily and accurately be located. In addition, besides being connected to the essential power supply, the panel shall have a battery backup with 72 hours autonomy such that the system would remain operative for three days despite a power failure. The panel is connected to the fire brigade by means of an auto dialler which shall be programmed to dial up selected numbers in the event of the fire alarm being triggered.

2.2 Rate of Rise Heat detectors.

Locations where vapour could be present shall be furnished with rate of rise heat detectors installed as indicated in the drawings. These shall have dual sensing facilities in that they are triggered both by a sudden rise in temperature as well as a fixed temperature mechanism set at 60°C. This combination makes them suitable to be installed where reliable performance and early warning capabilities are essential.

2.3 Break glass manual call points

These shall be located at strategic locations around the premises, essentially next to each exit such that in the event of someone noticing a fire in its conception stages prior to the heat detectors triggering, can sound the alarm by pressing the call point.

2.4 Fire alarm sounders

These shall be of the electronic sounder type rated at a minimum of 90dB at 1m. These shall be positioned as indicated in the drawing to ensure a minimum sounder level of 70dB at any location within the area.

2.5 Smoke detectors

Smoke detectors shall be used in most areas to detect a fire by the sensing of smoke. They shall be of the ionisation type or optical type as required in the particular area. The spacing and the sensitivity of the detectors shall be according to British Standard 5839.

2.6 Conclusion

From the above, it may be concluded that the premises shall be furnished with adequate fire detection measures.

3 Emergency escape routes

3.1 Maximum Travel Distances and Escape Widths

The Maximum Travel Escape Distances to be respected in this category are 18m when travel is in a single direction and 45m when two-directions of escape are possible onto a safe zone.

3.2 Lighting Installation

The premises shall also be furnished with Emergency lighting which will illuminate in the event of a utility failure and will hence enable the safe exit of personnel.

The emergency lights shall fall into three main categories namely:

- Non-maintained emergency lights which shall operate in the event of a utility failure. These are the most common type.
- Maintained emergency lights which shall remain illuminated at all times. These shall be installed primarily in the staircases.
- Illuminated exit signs. These shall of the maintained type and shall hence remain illuminated at all times. These shall be complete with a visual indication to clearly denote exit routes.

In certain areas photo luminescent exit signs shall also be installed as necessary in order identify the emergency escape routes.

Lighting shall be designed such that illuminance levels are in line CIBSE recommendations.

4 Ventilation Strategy

4.1 Ventilation details

Drawings indicate areas which are earmarked to be furnished according to International requirements with:

- A forced fresh air ventilation installation
- A forced extraction system within the bathrooms

4.2 Fresh air installation

Fresh air shall be introduced into the spaces from fresh air ducts passing over the false ceilings. In general, the air shall be drawn from the outside of the building, passed through a filter, ducted though a system of phenolic ductwork and discharged into spaces via a supply grill. The grills shall be furnished with volume control dampers in order to be able to set the air flows in each zone during the commissioning stages of the project.

In places where the ducts shall pass through compartments, they shall be protected with the use of fire dampers that shall seal the separate compartments in case of fire.

4.3 Extraction

The forced extraction shall occur from the bathrooms, kitchens or other areas pertinent to foul air is. Air shall be drawn through the grills and extracted to the outside of the building by means of the negative pressure generated by an extractor fan. All extraction grills shall also be furnished with dampers which shall be set during the commissioning stages of the project.

The extraction system in the bathrooms shall also be designed in accordance with CIBSE recommendations of greater to 5 air changes per hour. The toilets shall be kept under negative pressure.

4.4 Conclusion

From the above it may be observed that the building shall be furnished with ventilation systems which shall conform to international standards.

(B) Car Park Fire Safety

BS9999:2008 classifies Car Parks under Occupancy Characteristic type B, where the purpose group is described as Occupants who are awake and might be unfamiliar with the building. The Overall Risk Profile shall be B2, estimating a medium fire growth rate.

1 Fire Fighting Measures

The fire fighting installation shall be comprised mainly of a sprinkler system as indicated in the drawings. The system shall be designed and certified in accordance with international recommendations.

The fire fighting installation shall also entail a wet mains system in this area.

Both the sprinkler system and the wet mains system draw water from a dedicated water reserve.

1.1 Wet Mains system

The wet mains system shall be comprised of landing valves and hose reels connected together via a network of galvanised pipes.

The hose reels shall be regularly spaced within the car park. The landing valve shall be located in close proximity to the fire escapes to enable fire-fighting personnel to connect their flat type hoses, making all areas immediately accessible.

1.2 Conclusion

From the above, it may be observed that the garage shall be furnished with adequate fire fighting measures.

2 Fire detection System

The garage shall be furnished with a fire detection installation comprising of fire alarm monitoring panel, rate of rise heat detectors, smoke detectors, manual call points and fire alarm sounders.

2.1 Rate of Rise Heat detectors

The garage driveway and other locations where vapour could be present, shall be furnished with rate of rise heat detectors. These have dual sensing facilities in that they are triggered both by a

sudden rise in temperature as well as a fixed temperature mechanism set at 60°C. This combination makes them suitable to be installed where reliable performance and early warning capabilities are essential.

2.2 Break glass manual call points

These shall be located at strategic locations around the premises, essentially next to each exit such that in the event of someone noticing a fire in it conception stages prior to the heat detectors triggering, can sound the alarm by pressing the call point.

2.3 Fire alarm sounders

These are of the electronic sounder type rated and shall be positioned so as to ensure a minimum sounder level of 70dB at any location within the area.

2.4 Conclusion

From the above, it may be concluded that the premises shall be furnished with adequate fire detection measures.

3 Emergency escape routes

3.1 Maximum Travel Distances and Escape Widths

The Maximum Travel Distances to be respected in this category is 50m.

3.2 Lighting Installation

The light fittings installed in the car park are rated to IP 65 which makes them particularly suited for this type of environment in that they are resistant to the ingress of both dust and water.

The premises shall also be furnished with Emergency lighting which will illuminate in the event of a utility failure and will hence enable the safe exit of vehicles and pedestrians.

The emergency lights fall into three main categories namely

- Non-maintained emergency lights which shall operate in the event of a utility failure. These are the most common type

- Maintained emergency lights which shall remain illuminated at all times. These shall be installed primarily in the staircases.

- Illuminated exit signs. These shall of the maintained type and shall hence remain illuminated at all times. These shall be complete with a visual indication to clearly denote exit routes.

In certain areas photo luminescent exit signs shall also be installed as necessary in order identify the emergency escape routes.

Lighting shall be designed such that illuminance levels are in line CIBSE recommendations.

4 Ventilation

With reference to the ventilation requirements for the car park of the above captioned project, please find our considerations as follows:

4.1 Car Park Ventilation

The car park is located above ground. It shall be provided with natural ventilation. The ventilation opening in the outside wall shall be of at least 5% of the floor area.

4.2 Conclusion

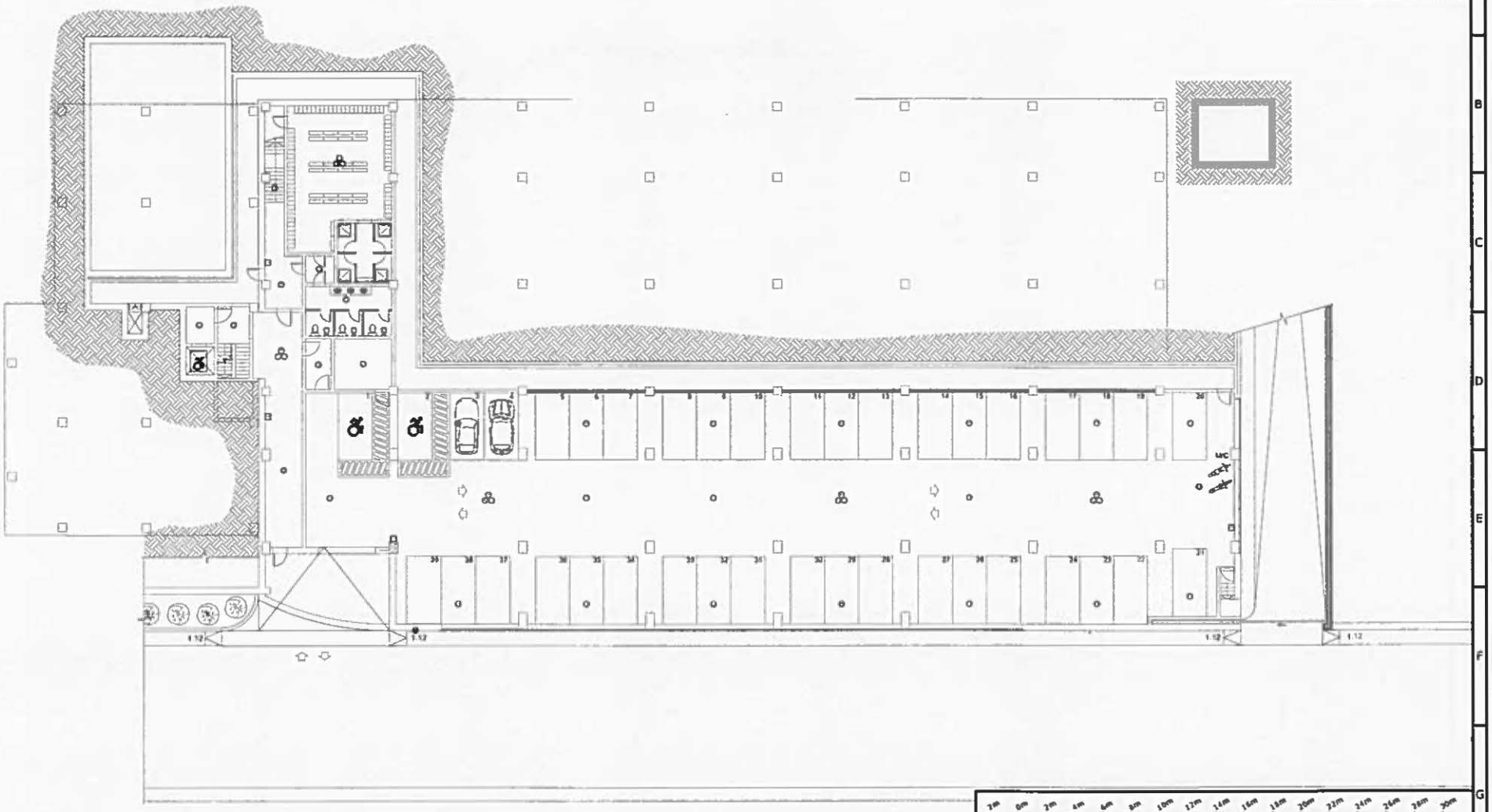
From the above it may be concluded that the car park shall be provided with suitable ventilation measures.
It may also be observed that the garage shall conform to international standards as well as to local safety legislation.

5 Structural and architectural considerations

It is deemed that the structural considerations for the building such as the building's fire integrity, fire resistance of structural elements, fire doors, fire compartments, escape routes and escape widths indicated in this report shall be reviewed and ensured by third parties.

We trust that the above meet your requirements.

Regards,
Ing. Owen Vassallo



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PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

No.	Date	By	Revision/Issue
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02	07.07.17		Revised Layout
01	29.05.17		Revised Layout

Job No.: 17.019	Drawing No.: SFR.0.FD.01	Revision No.: 02
Scale: 1:200	Paper Size: A2	Checked By:
Date: 29.05.17	Drawn By:	

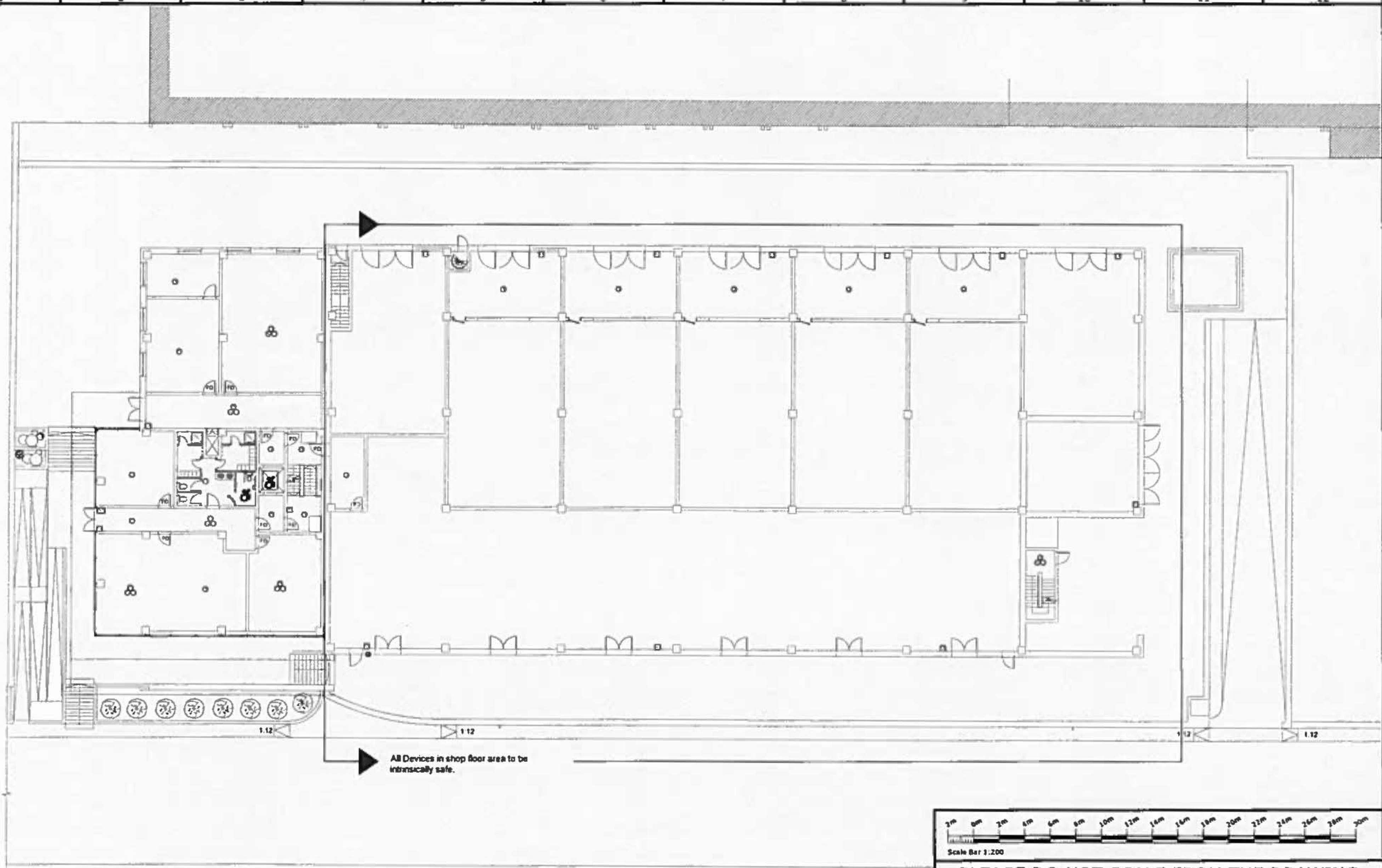
Position: Level 0

Service: Fire Detection

Project Name & Address:

Factory HF53, Hal Far

CAMILLERI & CUSCHIERI
Consulting Engineers
Tel +356 21 [illegible], +356 21 [illegible] Fax: +356 21 225747,
mobile: +356 9949 2900, +356 9945 5495
E-mail: info@camilleriandcuschieri.com



PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

No.	Date	By	Revision/Issue
-	-		-
02	07.07.17		Revised Layout
01	30.05.17		Revised Layout

Job No.:	Drawing No.:	Revision No.:
17.019	SFR.1.FD.01	02
Scale:	**Paper Size:**	**Checked By:**
1:200	A2	
Date:	**Drawn By:**	
29.05.17		

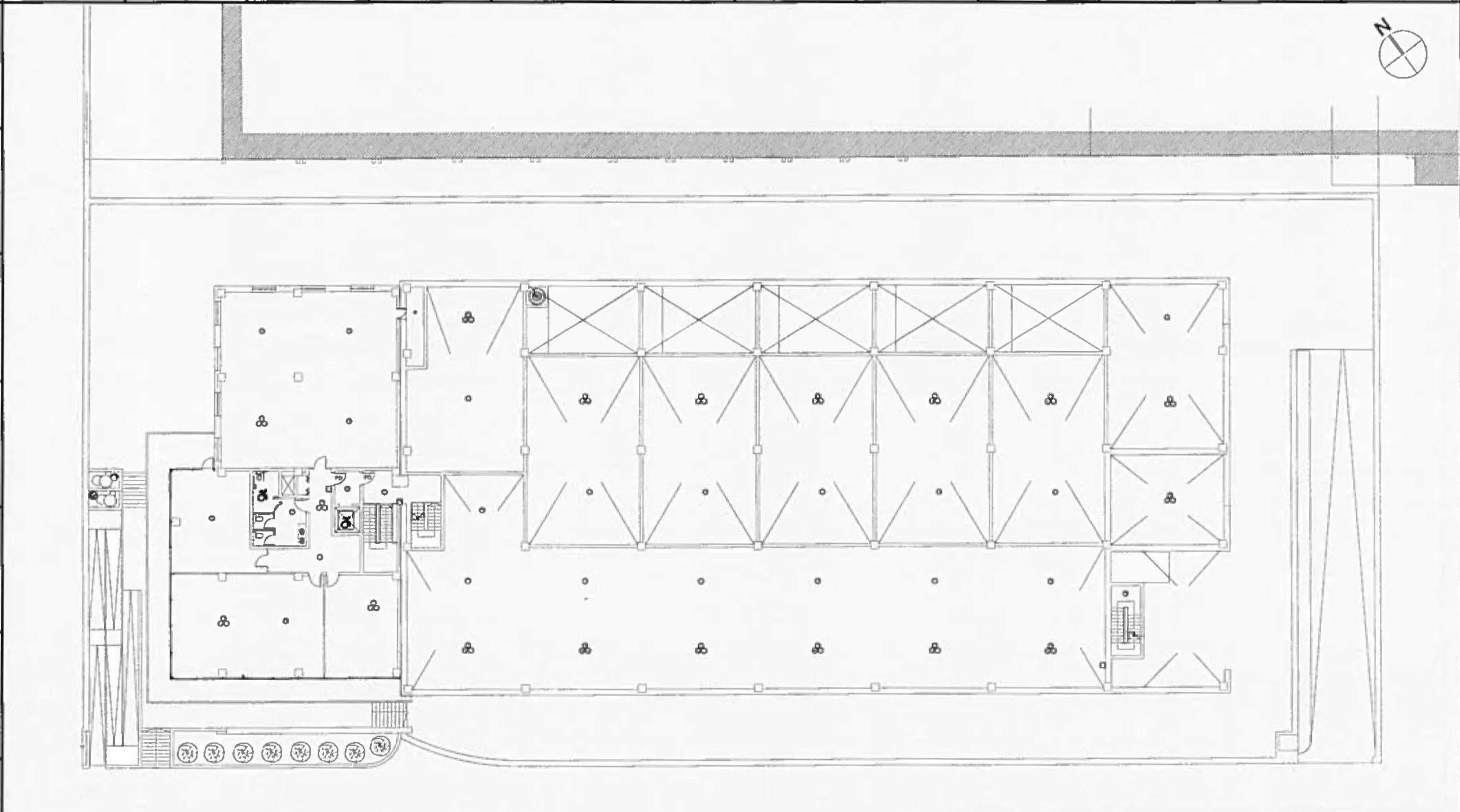
Position: Level 1

Service: Fire Detection Installation

Project Name & Address:

Factory HF53, Hal Far

CAMILLERI & CUSCHIERI
Consulting Engineers



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PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

Legend :

Symbol	Description
	Optical Smoke Detector
	Heat Detector
	Combined Optical Smoke Detector Fire Sounder and Flashing Beacon
	Combined Heat Detector Fire Sounder and Flashing Beacon
	Manual Call Point

No.	Date	By	Revision/Issue
-	-		-
02	07.07.17		Revised Layout
01	30.05.17		Revised Layout

Job No.: 17.019	Drawing No.: SFR.2.FD.01	Revision No.: 02
Scale: 1:200	Paper Size: A2	Checked By:
Date: 29.05.17	Drawn By:	

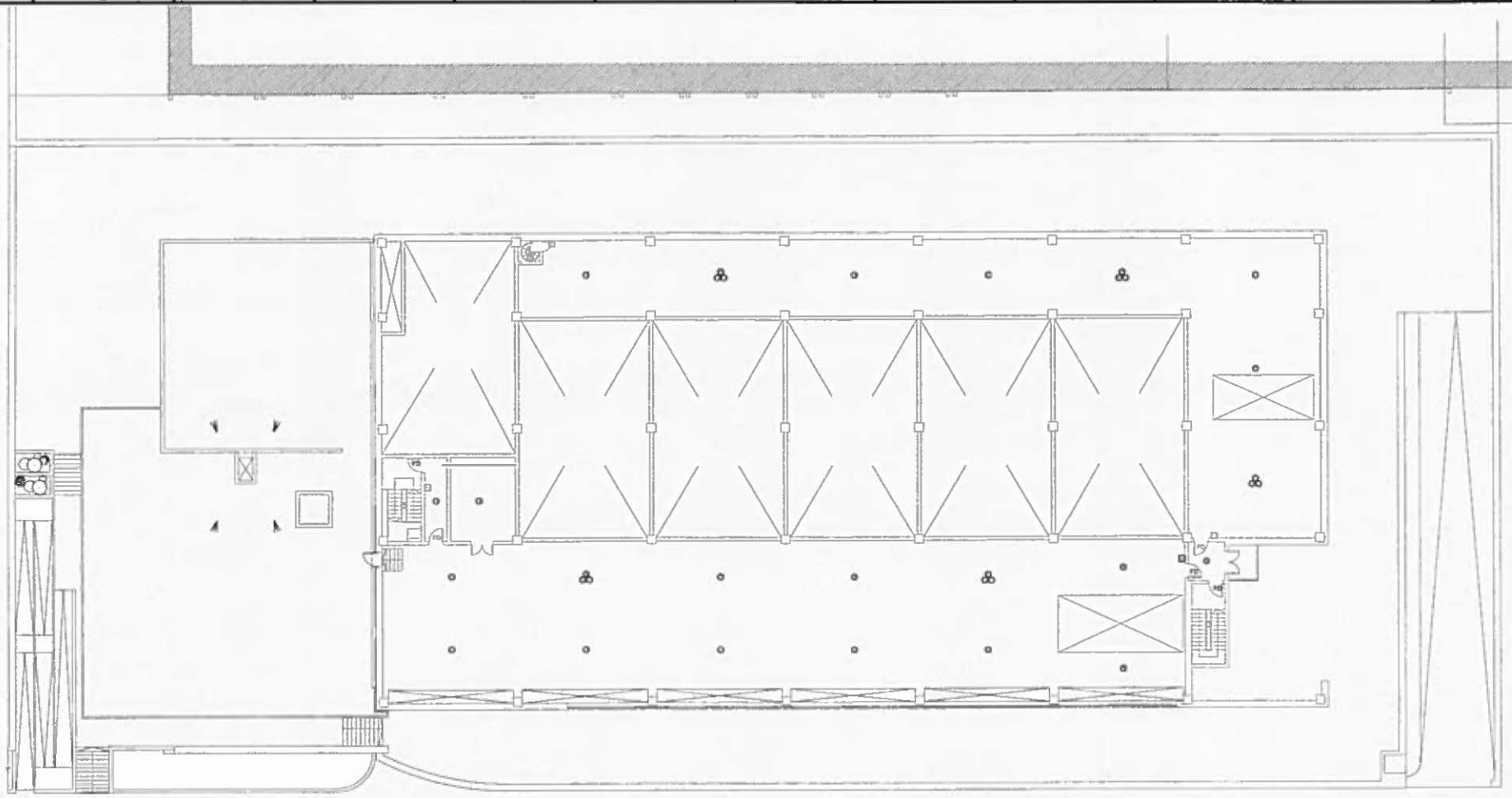
Position: Level 2

Service: Fire Detection Installation

Project Name & Address:

Factory HF53, Hal Far

CAMILLERI & CUSCHIERI
Consulting Engineers



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PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

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02	07.07.17		Revised Layout
01	30.05.17		Revised Layout

Job No..	Drawing No..	Revision No.
17.019	SFR.3.FD.01	02
Scale: 1:200	Paper Size: A1	Checked By:
Date: 29.05.17	Drawn By:	

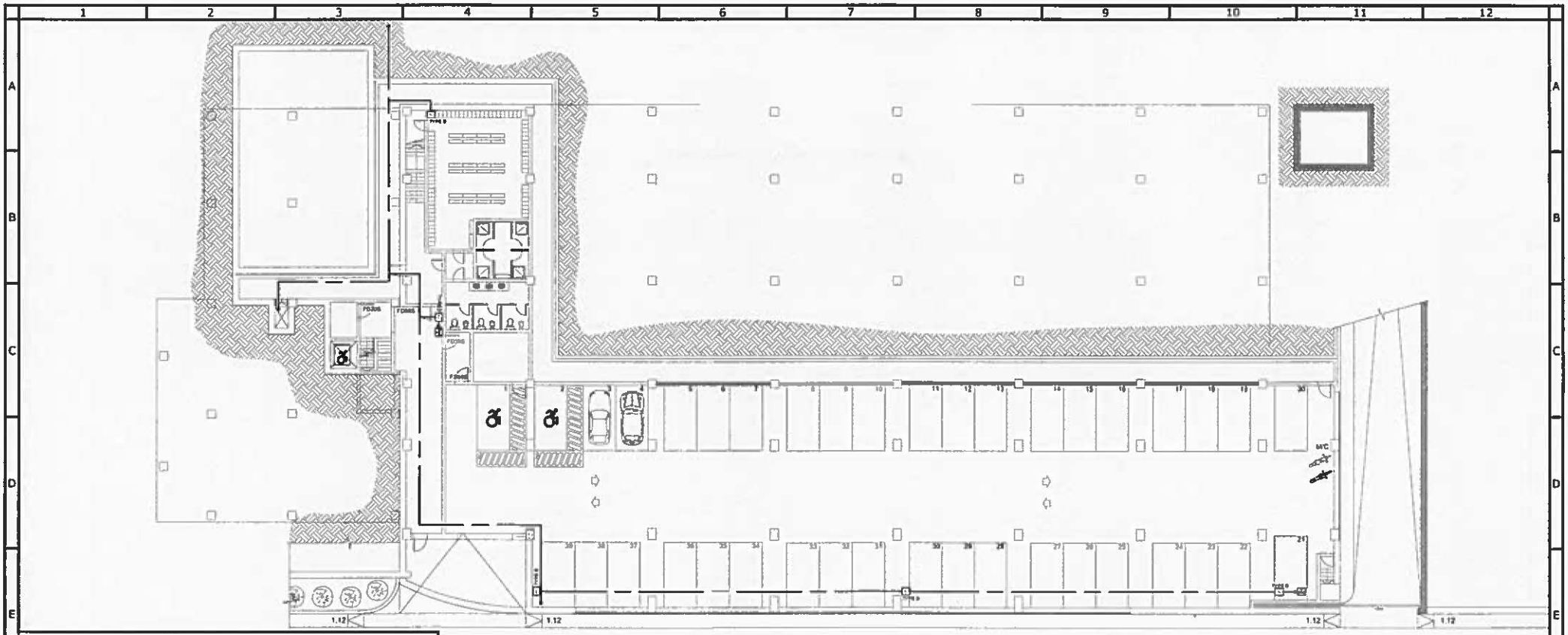
Position: Level 3

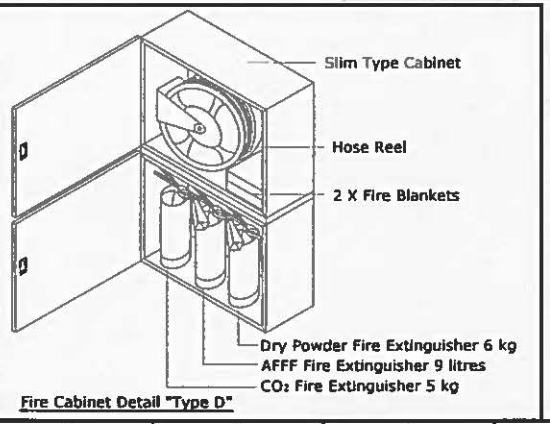
Service: Fire Detection Installation

Project Name & Address:

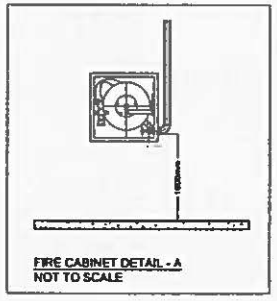
Factory HF53, Hal Far

CAMILLERI & CUSCHIERI
Consulting Engineers

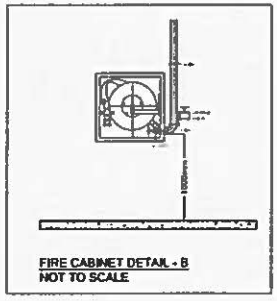




Fire Cabinet Detail "Type D"



FIRE CABINET DETAIL - A
NOT TO SCALE



FIRE CABINET DETAIL - B
NOT TO SCALE

LEGEND.

FC	FIRE EXTINGUISHER CABINET
	FIRE FIGHTING PIPEWORK
	BREECH POINT
	FIRE TROLLEY WITH SODIUM BICARBONATE EXTINGUISHING POWDER
FE	TYPE C. WALL HUNG FIRE EXTINGUISHER SODIUM BICARBONATE 9kg

Scale Bar 1:200

PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

No.	Date	By	Revision/Issue
-	-		-
-	-		-
01	07.07.17		Revised Layout

Job No.: 17.019	Drawing No.: SFR.0.FF.01	Revision No.: 01
Scale: 1:200	Paper Size: A2	Checked By:
Date: 05.06.17	Drawn By:	

Position: Level 0

Service: Fire Fighting Installation Layout

Project Name & Address:

Factory HF53, Hal Far

CAMILLERI & CUSCHIERI
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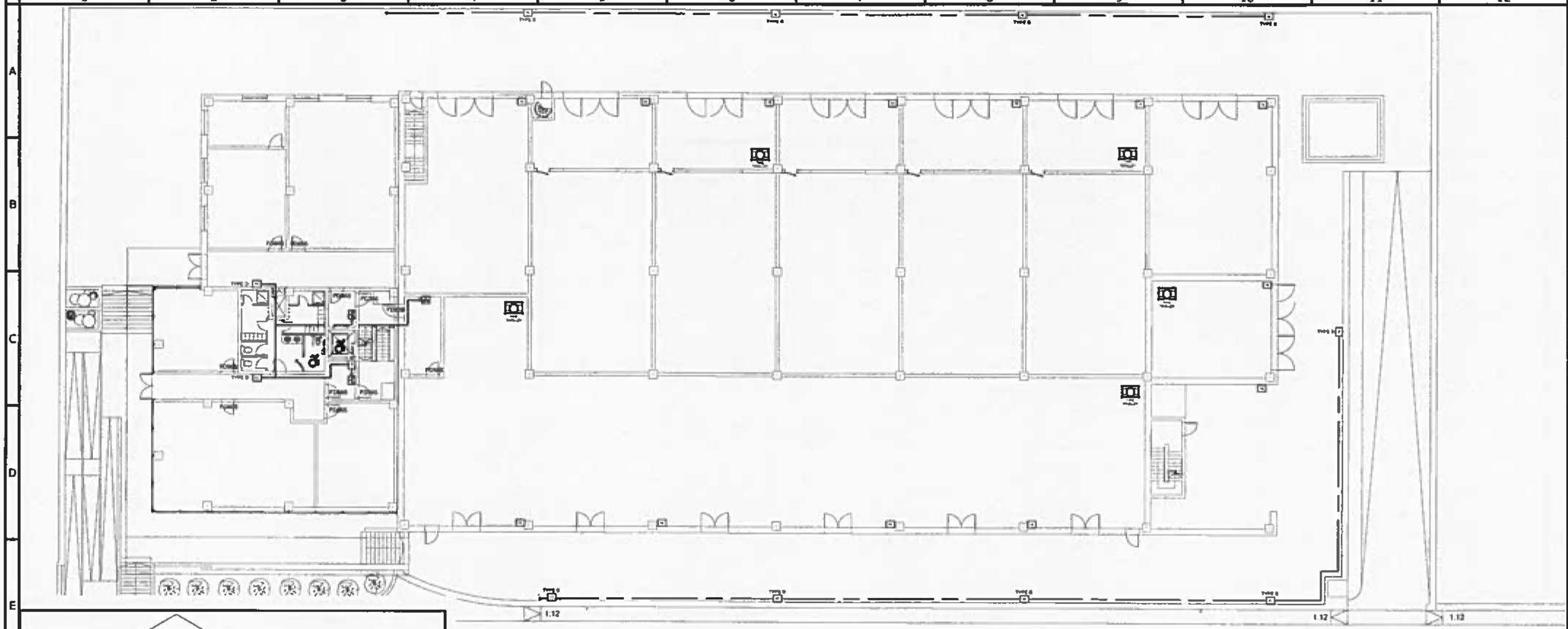
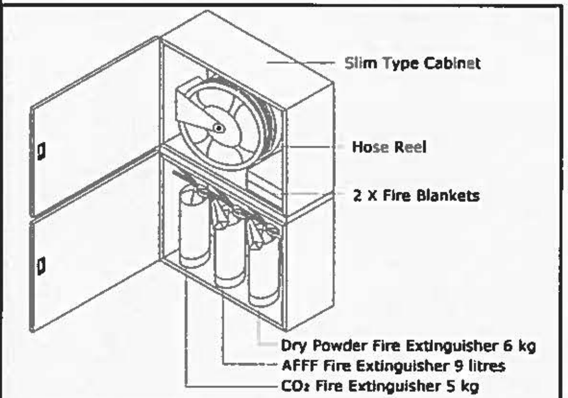
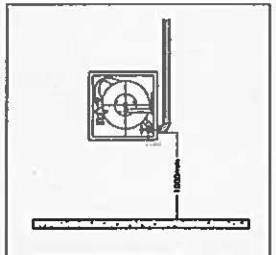
E-mail: info@camilleri-cuschieri.com





Fire Cabinet Detail "Type D"



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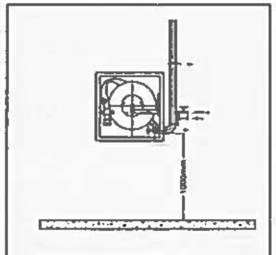


FIRE CABINET DETAIL - B
NOT TO SCALE

LEGEND

Symbol	Description
FC	FIRE EXTINGUISHER CABINET
	FIRE FIGHTING PIPEWORK
	BREECH POINT
	FIRE TROLLEY WITH SODIUM BICARBONATE EXTINGUISHING POWDER
FE	TYPE C. WALL HUNG FIRE EXTINGUISHER SODIUM BICARBONATE 9kg

Scale Bar 1:200

PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

No.	Date	By	Revision/Issue
-	-	-	-
-	-	-	-
01	07.07.17		Revised Layout

Job No.:	Drawing No.:	Revision No.:
17.019	SFR.1.FF01	01
Scale: 1:200	Paper Size: A2	Checked By:
Date: 29.05.17	Drawn By:	

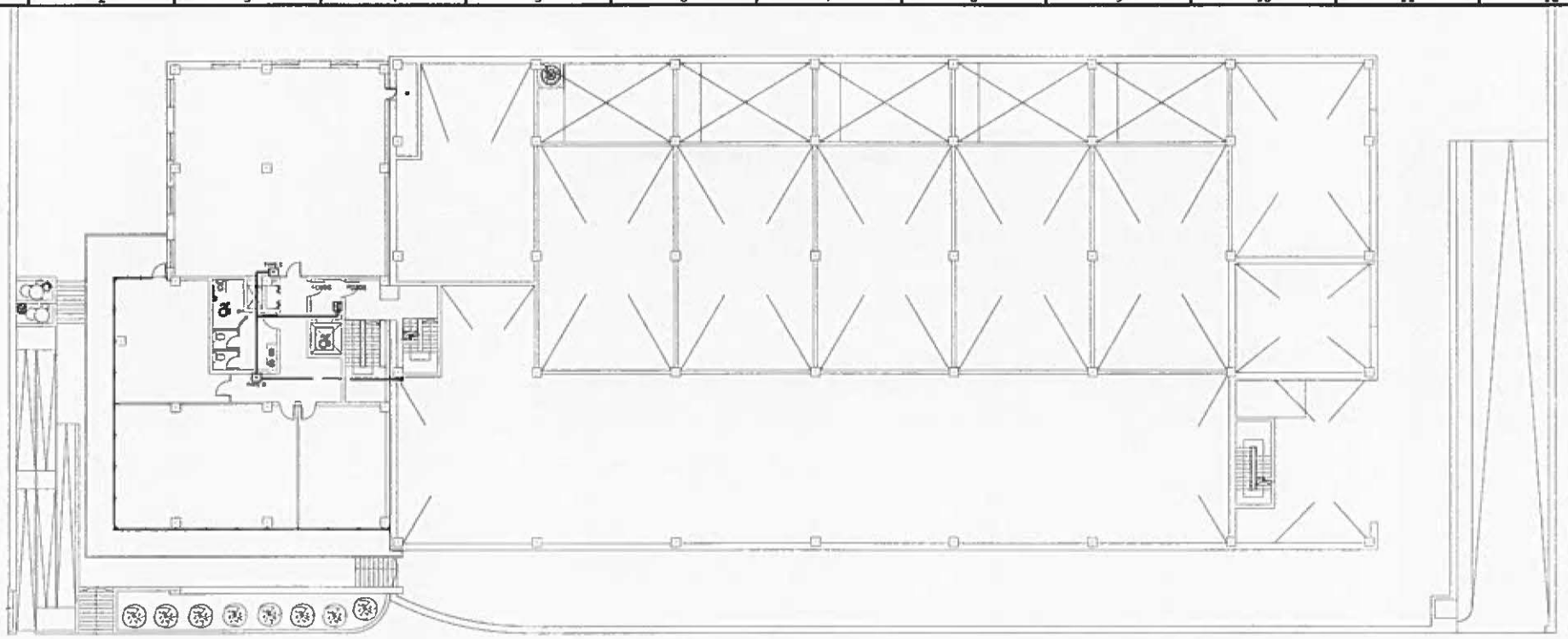
Position: Level 1

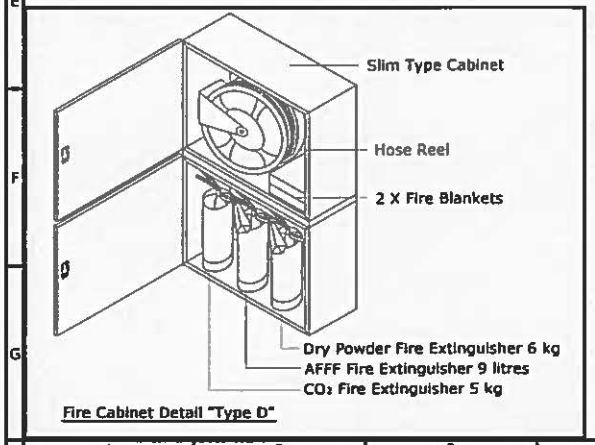
Service: Fire Fighting Installation Layout

Project Name & Address:

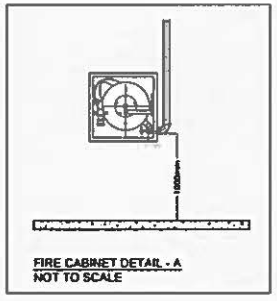
Factory HF53, Hal Far

CAMILLERI & CUSCHIERI
Consulting Engineers

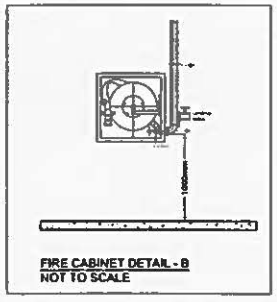




Fire Cabinet Detail "Type D"



FIRE CABINET DETAIL - A
NOT TO SCALE



FIRE CABINET DETAIL - B
NOT TO SCALE

LEGEND:

FC	FIRE EXTINGUISHER CABINET
	FIRE FIGHTING PIPEWORK
	BREECH POINT
	FIRE TROLLEY WITH SODIUM BICARBONATE EXTINGUISHING POWDER
FE	TYPE C WALL HUNG FIRE EXTINGUISHER SODIUM BICARBONATE 9kg

Scale Bar 1:200

PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

No.	Date	By	Revision/Issue
-	-		-
-	-		-
01	07.07.17		Revised Layout

Job No.: 17.019	Drawing No.: SFR.1.FF.01	Revision No.: 01
Scale: 1:200	Paper Size: A2	Checked By:
Date: 29.05.17	Drawn By:	

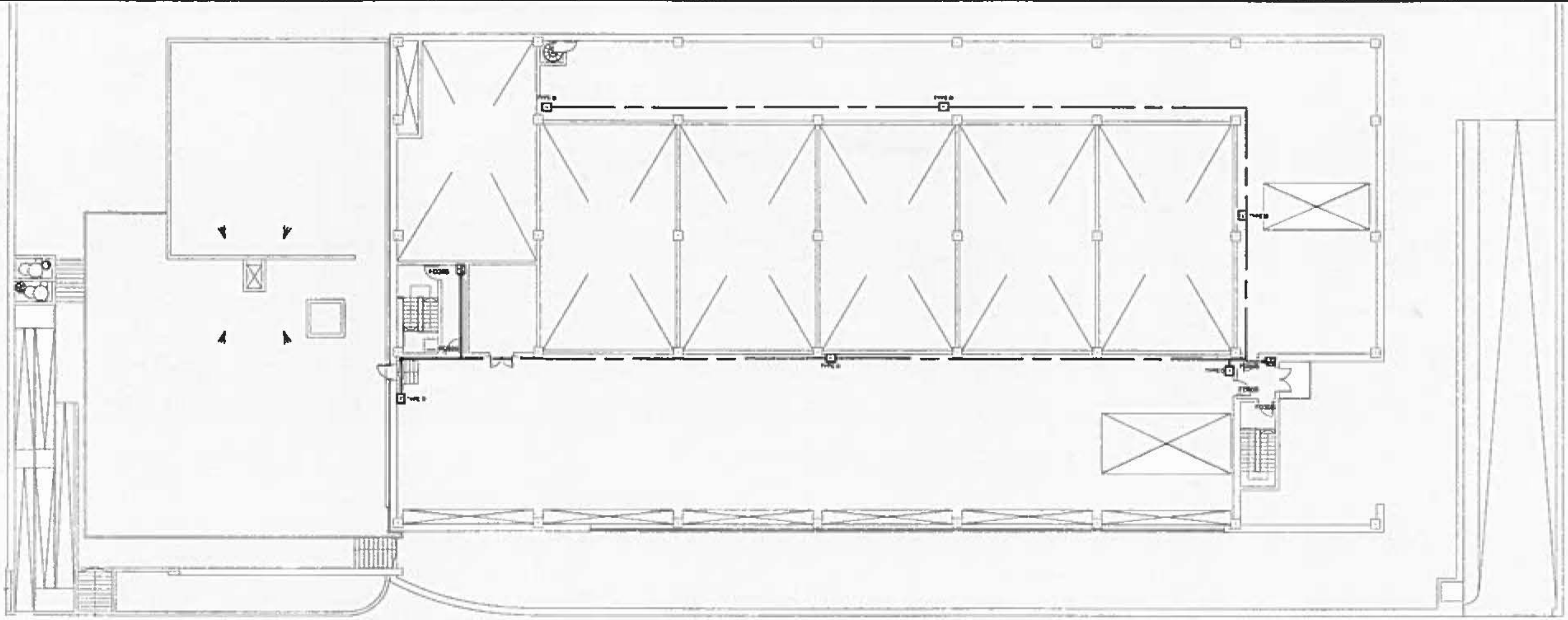
Position: Level 2

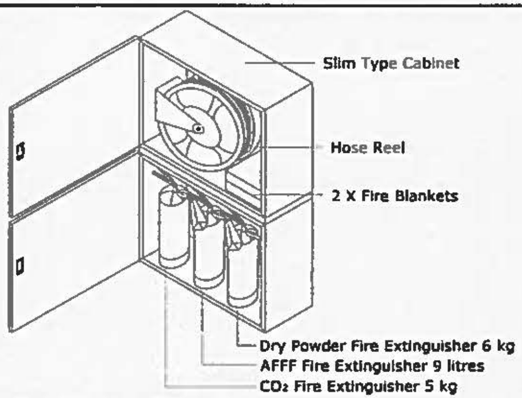
Service: Fire Fighting Installation Layout

Project Name & Address:

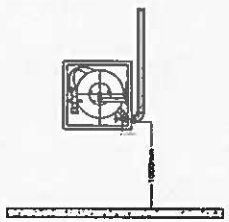
Factory HF53, Hal Far

CAMILLERI & CUSCHIERI
Consulting Engineers

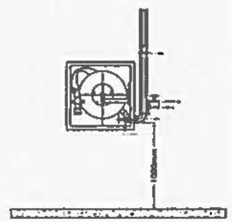




Fire Cabinet Detail "Type D"



FIRE CABINET DETAIL - A
NOT TO SCALE



FIRE CABINET DETAIL - B
NOT TO SCALE

LEGEND.

FC	FIRE EXTINGUISHER CABINET
	FIRE FIGHTING PIPEWORK
	BREECH POINT
	FIRE TROLLEY WITH SODIUM BICARBONATE EXTINGUISHING POWDER
FE	TYPE C WALL HUNG FIRE EXTINGUISHER SODIUM BICARBONATE 9kg

Scale Bar 1:200

PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

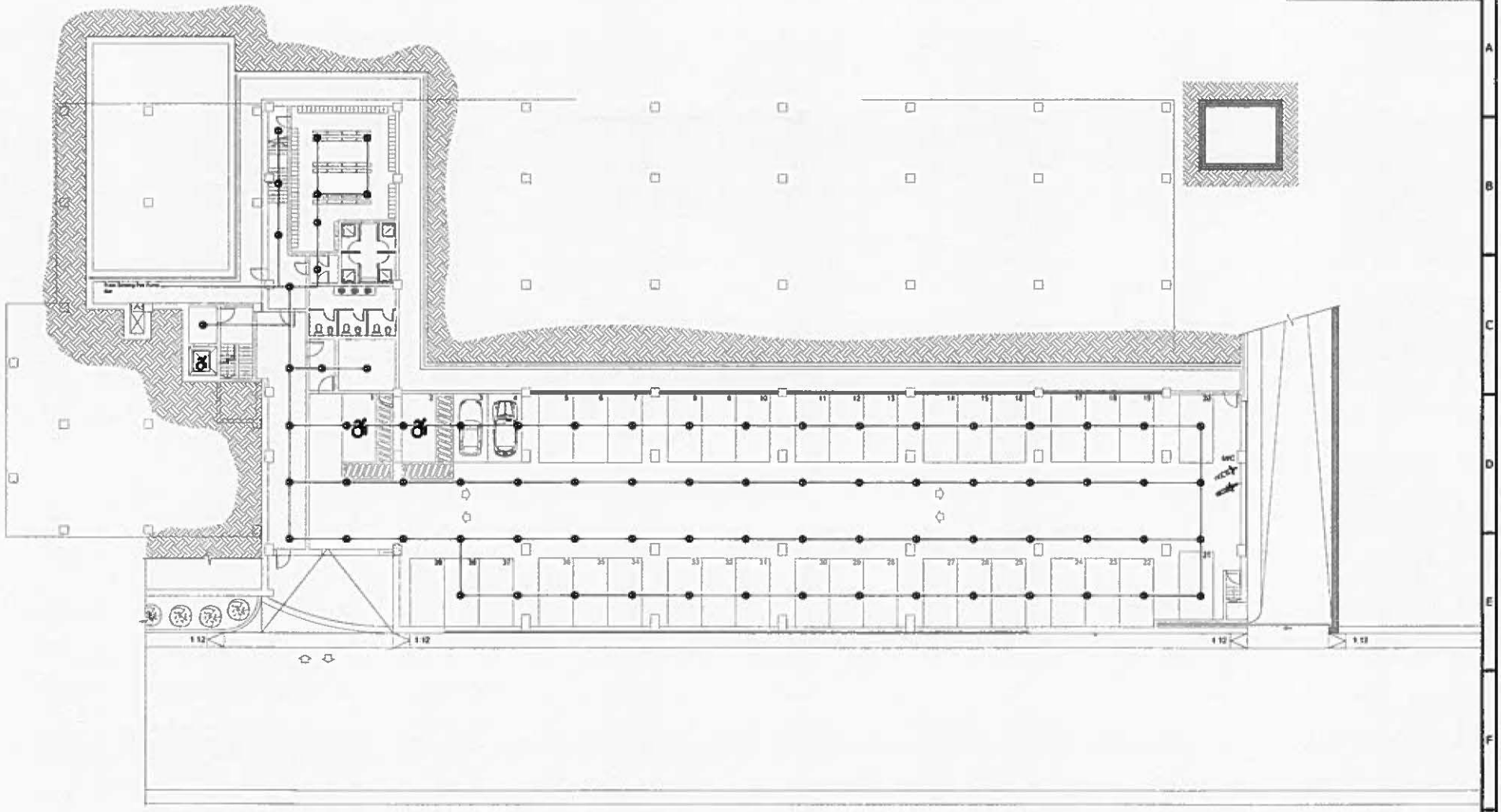
No.	Date	By	Revision/Issue
-	-		-
-	-		-
01	07.07.17		Revised Layout

Job No.:	Drawing No.:	Revision No.:
17.019	SFR.3.FF.01	01
Scale: 1:200	**Paper Size:** A2	**Checked By:**
Date: 29.05.17	**Drawn By:**	

Position: Level 3
Service: Fire Fighting Installation Layout

Project Name & Address:
Factory HF53, Hal Far

CAMILLERI & CUSCHIERI
Consulting Engineers



Scale Bar 1:200

PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

No.	Date	By	Revision/Issue
-	-		-
02	07.07.17		Revised Layout
01	29.05.17		Revised Layout

Job No.: 17.019	Drawing No.: SFR.0.SP0.01	Revision No.: 02
Scale: 1:200	Paper Size: A2	Checked By:
Date: 29.05.17	Drawn By:	

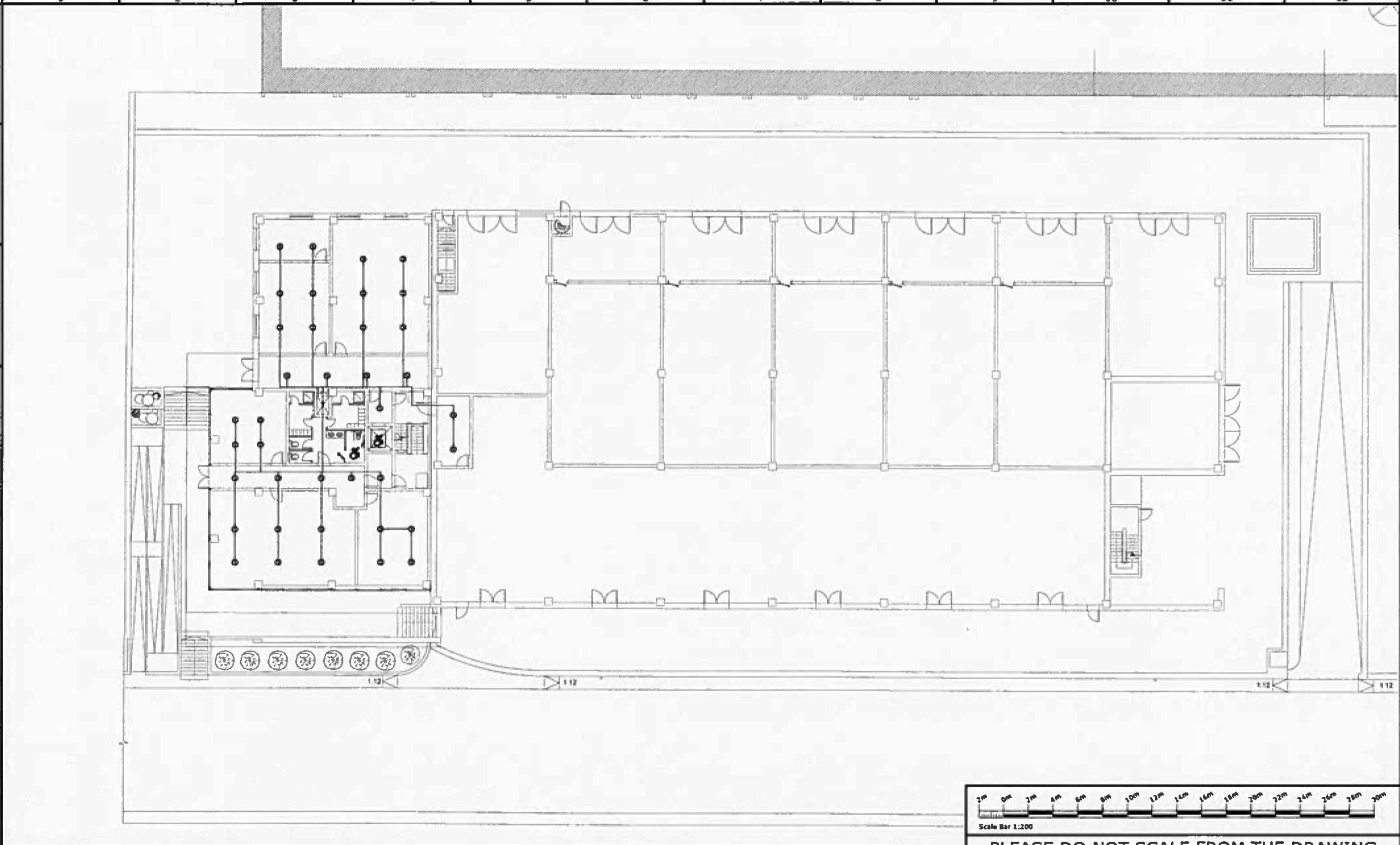
Position: Level 0

Service: Sprinkler Installation Layout

Project Name & Address:

Factory HF53, Hal Far

CAMILLERI & CUSCHIERI
Consulting Engineers



PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

Legend:
Sprinkler

No.	Date	By	Revision/Issue
-	-	-	-
02	07.07.17		Revised Layout
01	30.05.17		Revised Layout

Job No.:	Drawing No.:	Revision No.:
17.019	SFR.1.SPR.01	02
Scale: 1:200	Paper Size: A2	Checked By:
Date: 29.05.17	Drawn By:	

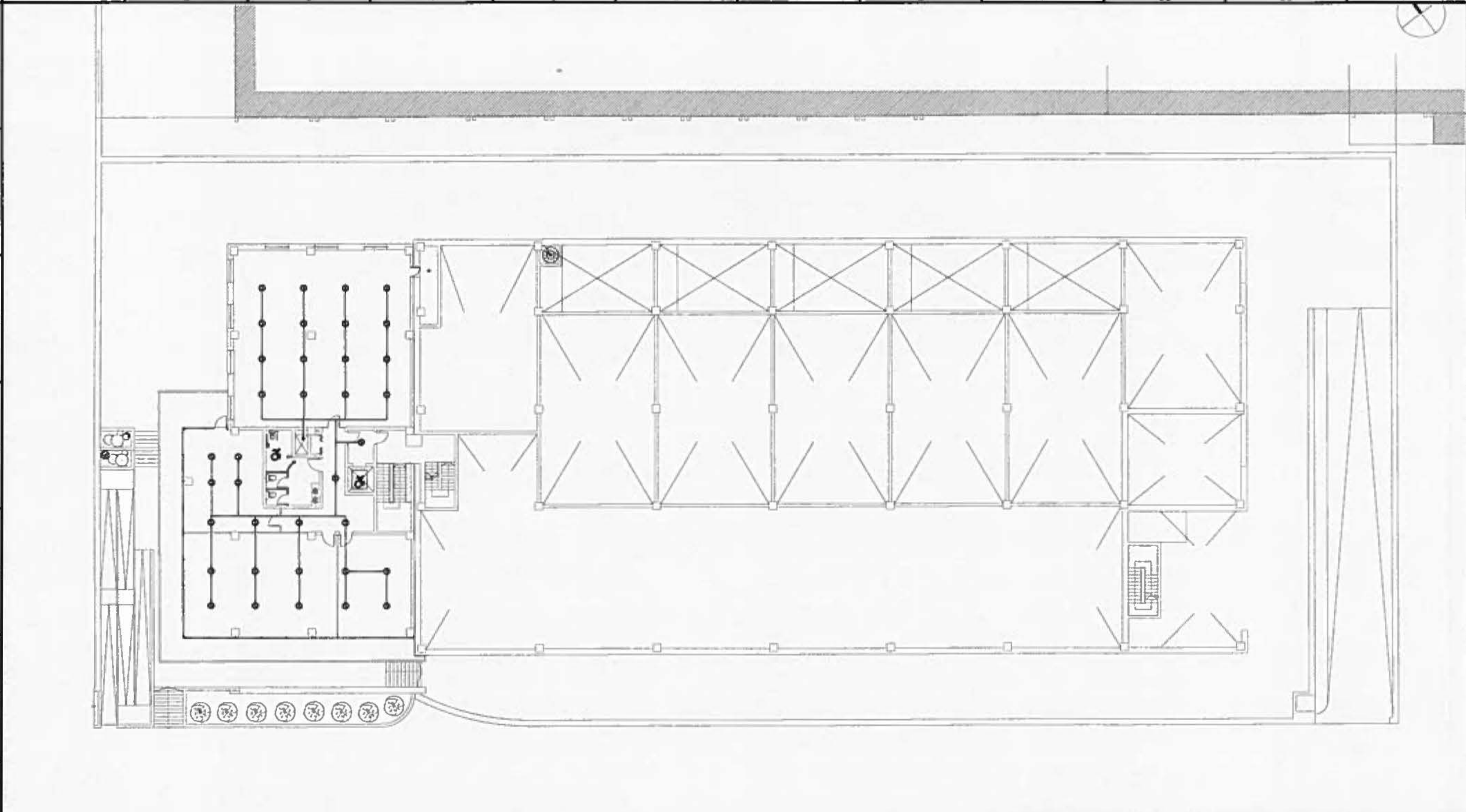
Position: Level 1

Service: Sprinkler Installation Layout

Project Name & Address:

Factory HF53, Hal Far

CAMILLERI & CUSCHIERI
Consulting Engineers



Scale Bar 1:200

PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

Legend:
Sprinkler

No.	Date	By	Revision/Issue
-	-		-
02	07.07.17		Revised Layout
01	30.05.17		Revised Layout

Job No.:	Drawing No.:	Revision No.:
17.019	SFR.2.SPR.01	02
Scale:	**Paper Size:**	**Checked By:**
1:200	A2	
Date: 29.05.17	**Drawn By:**	

Position: Level 2

Service: Sprinkler Installation Layout

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Project Name & Address:

Factory HF53, Hal Far

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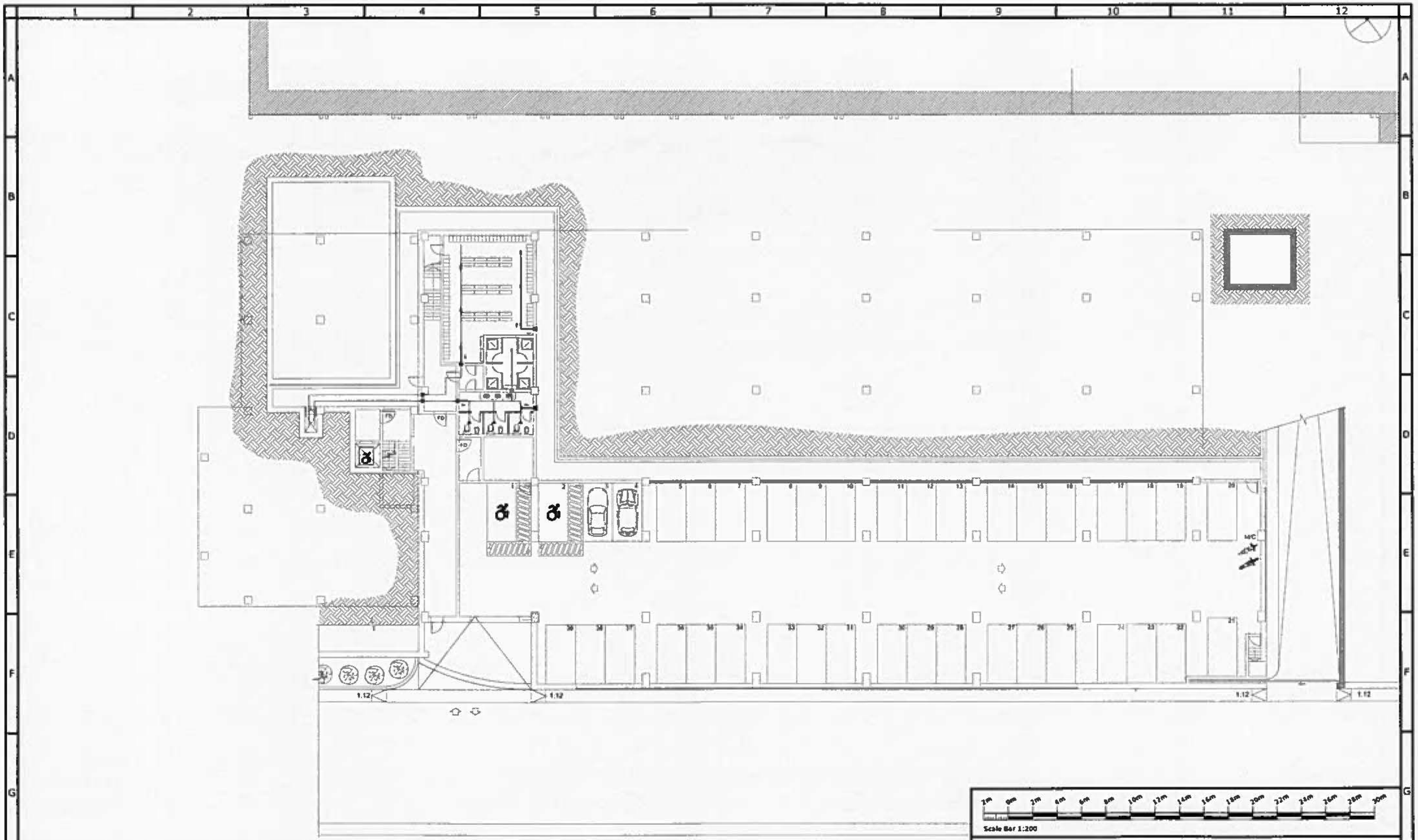
Consulting Engineers



PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

Notes:
SG indicating means supply grill
EG indicating means extract grill

Legend:
Ductwork
Pressure Relief Damper
Louver
Grill
Fire Damper
Fan

No.	Date	By	Revision/Issue
-	-		-
02	07.07.17		Revised Layout
01	29.05.17		Revised Layout

Job No.:	Drawing No.:	Revision No.:
17.019	SFR.0.VNT.01	02
Scale: 1:200	**Paper Size:** A2	**Checked By:**
Date: 29.05.17	**Drawn By:**	

Position: Level 0

Service: Ventilation Installation Layout

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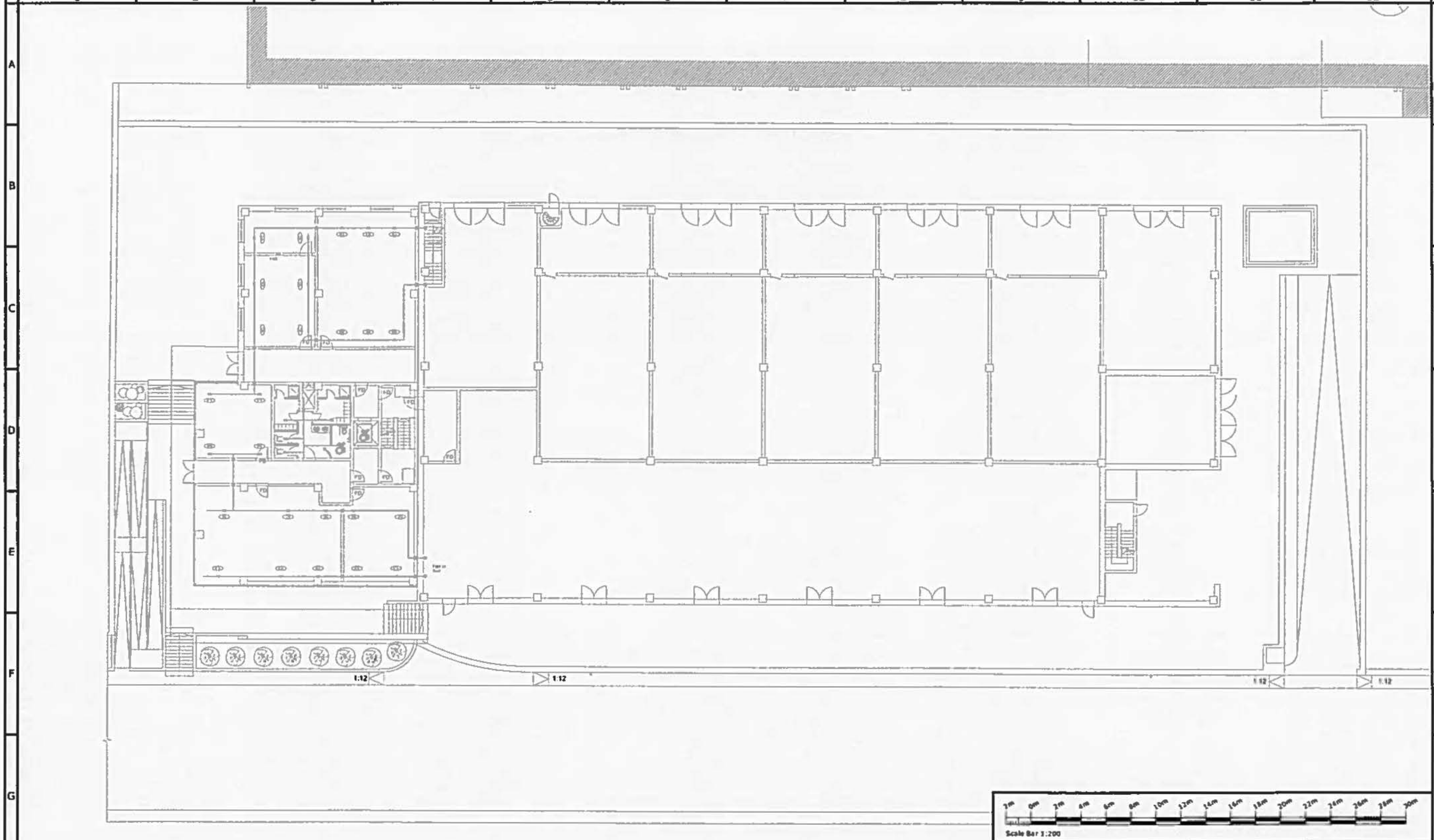
Project Name & Address:

Factory HF53, Hal Far

CAMILLERI & CUSCHIERI
Consulting Engineers



PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

Notes: -
SG labeling means supply grill
EG labeling means extract grill

Legend: -	
	Ductwork
	Pressure Relief Damper
	Louver
	Grill
	Fire Damper
	Fan

No.	Date	By	Revision/Issue
-	-		-
02	07.07.17		Revised Layout
01	30.05.17		Revised Layout

Job No.:	Drawing No.:	Revision No.:
17.019	SFR.1.VNT.01	02
Scale: 1:200	Paper Size: A2	Checked By:
Date: 29.05.17	Drawn By:	

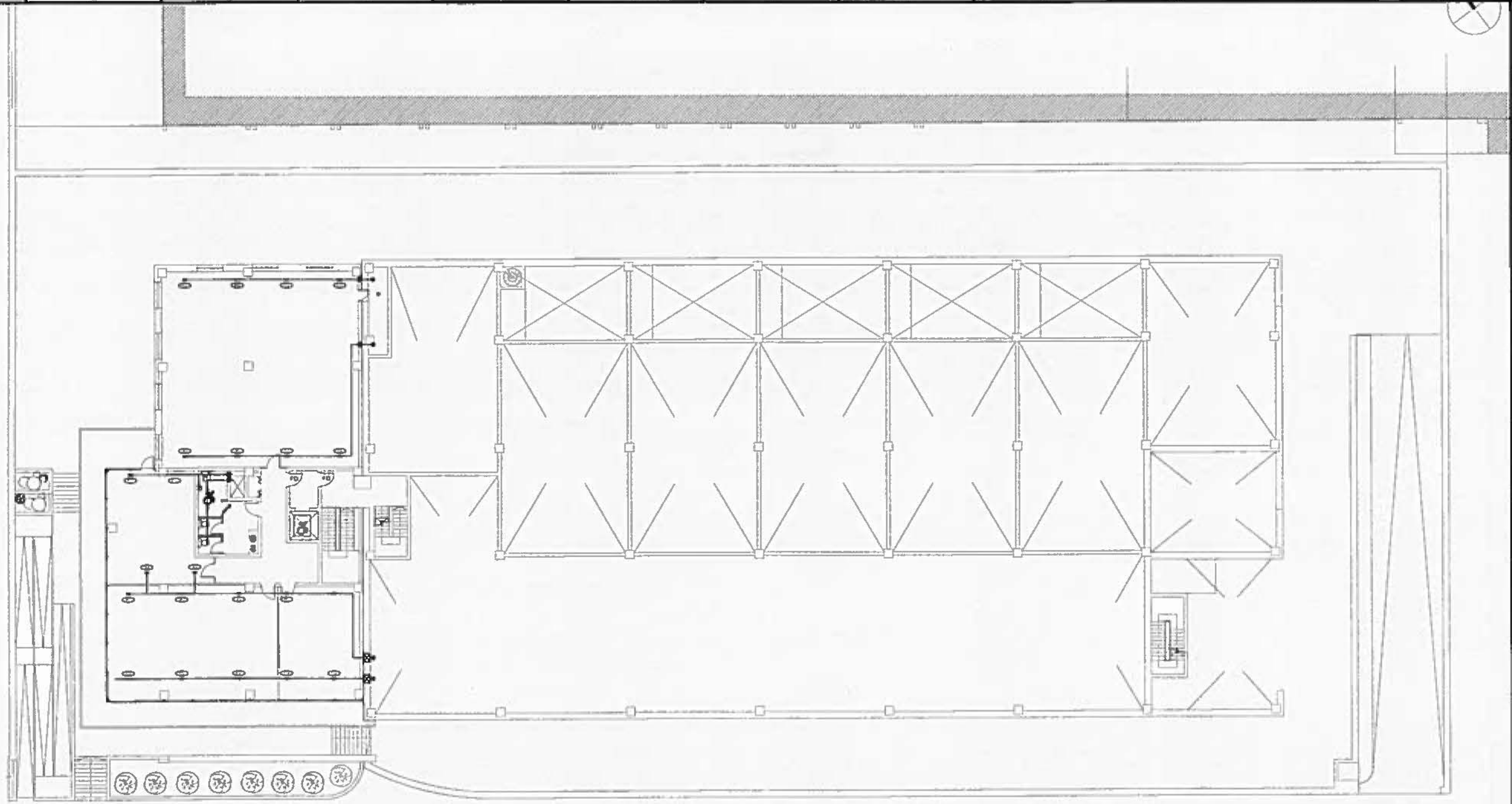
Position: Level 1

Service: Ventilation Installation Layout

Project Name & Address:

Factory HF53, Hal Far

CAMILLERI & CUSCHIERI
Consulting Engineers



Scale Bar 1:200

PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

Notes:
SG labeling means supply grill
EG labeling means extract grill

Legend:

Symbol	Description
[symbol]	Ductwork
[symbol]	Pressure Relief Damper
[symbol]	Louver
[symbol]	Grill
[symbol]	Fire Damper
[symbol]	Fan

No.	Date	By	Revision/Issue
-	-		-
02	07.07.17	[signature]	Revised Layout
01	30.05.17	[signature]	Revised Layout

Job No.:	Drawing No.:	Revision No.:
17.019	SFR.2.VNT.01	02
Scale: 1:200	**Paper Size:** A2	**Checked By:**
Date: 29.05.17	**Drawn By:** [signature]	

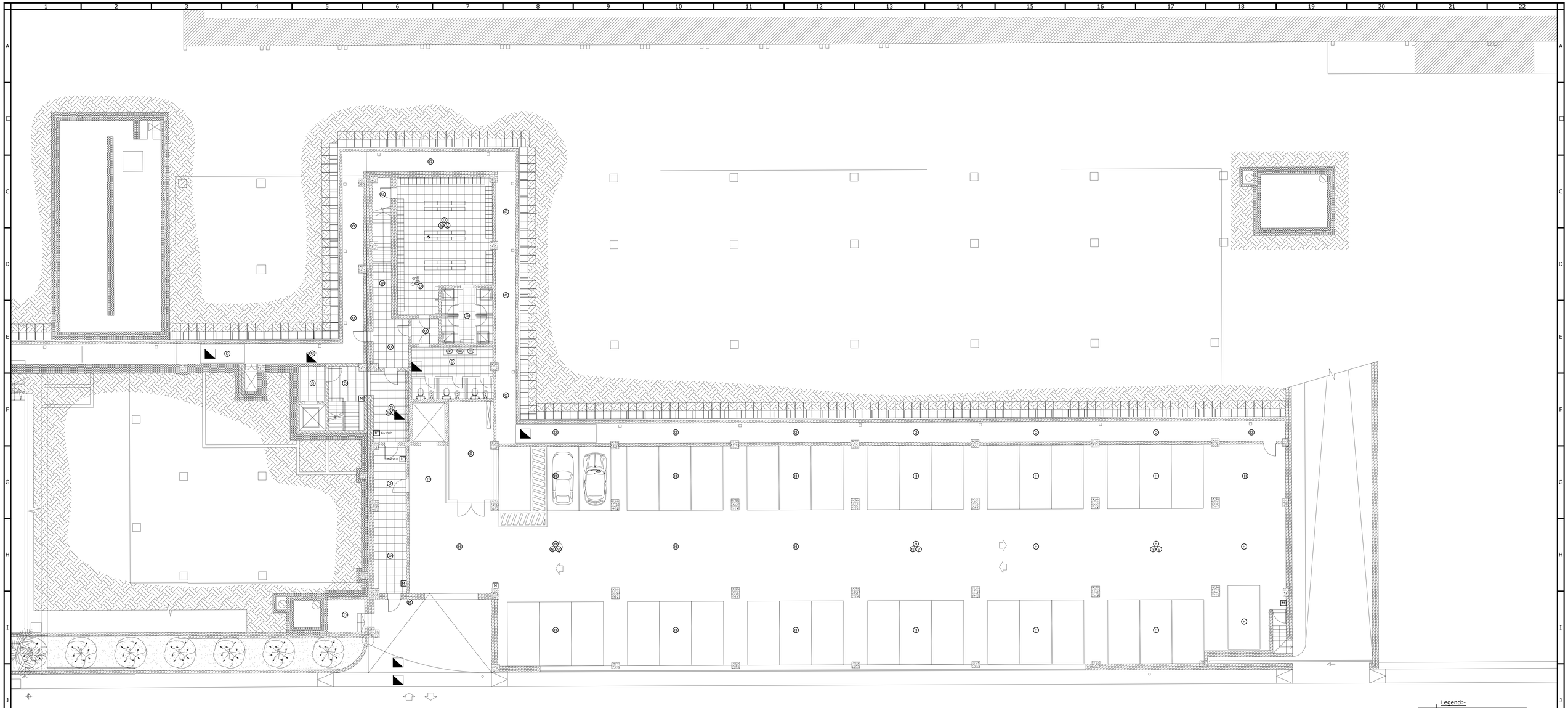
Position: Level 2

Service: Ventilation Installation Layout

Project Name & Address:

Factory HF53, Hal Far

CAMILLERI & CUSCHIERI
Consulting Engineers



Fire Detection General Notes:-

1. Cable to □S 6387 CAT CW□shall be used. Cable shall be generall□run surface above false ceiling, clipped to structural ceiling, parallel with the lines of building construction.
2. Proprietar□cable retaining clips and cable glands should be used installed at 300mm intervals.
3. Exact location of fire alarm panel to be determined on site.
4. Exact position of fire detection devices to be coordinated with the soffit installation la□out.
5. Manual call points to be installed at 1200mm from the finished floor level □F.F.L□
6. Loop isolators to be installed in ever□entr□exit from each floor.
7. Combined sounders and beacons shall be preferred.
8. Downdrops shall be minimum Ø25mm conduit.
9. All devices including detectors, call points, remote indicators shall have address fixed onto them. Address shall be printed on self adhersive media □ot hand written□
10. Magnetic door releases to be interfaced with the fire alarm panel.
11. Detectors should not be mounted closer than 500mm from an□obstruction or wall.

Optical Smoke Detector - Installation Onto False Ceiling

Optical Smoke Detector - Installation Onto Slab

Legend:-

H	Rate Of Rise Heat Detector
O	Optical Smoke Detector
In	Internal Fire Sounder
Ex	External Fire Sounder
Ex	Fire Sounder Explosion Proof
V	Flashing □eacon
Ex V	External Flashing □eacon
Ex V	Flashing □eacon Explosion Proof
M	Manual Call Point
M	Manual Call Point Explosion Proof
H V	Rate Of Rise Heat Detector c/w Sounder and □eacon
O V	Optical Smoke Detector c/w Sounder and □eacon
Ex V	External Fire Sounder c/w Flashing □eacon
In V	Fire Sounder c/w Flashing □eacon
T	□eam Transmitter Explosion Proof
R	□eam Receiver Explosion Proof
FAP	Fire Alarm Panel
FARP	Fire Alarm Repeater Panel
A□C	Auto Dailler
I/O	Interface □it
	Magnetic Door Release

1m 0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m 11m 12m 13m 14m 15m

Scale □ar 1:100

PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

No.	Date	□□	Revision/Issue
-	-	-	-
-	-	-	-
-	-	-	-

No.	Date	□□	Revision/Issue
-	-	-	-
-	-	-	-
01	05.02.18	AZ	Revised Archeitectural

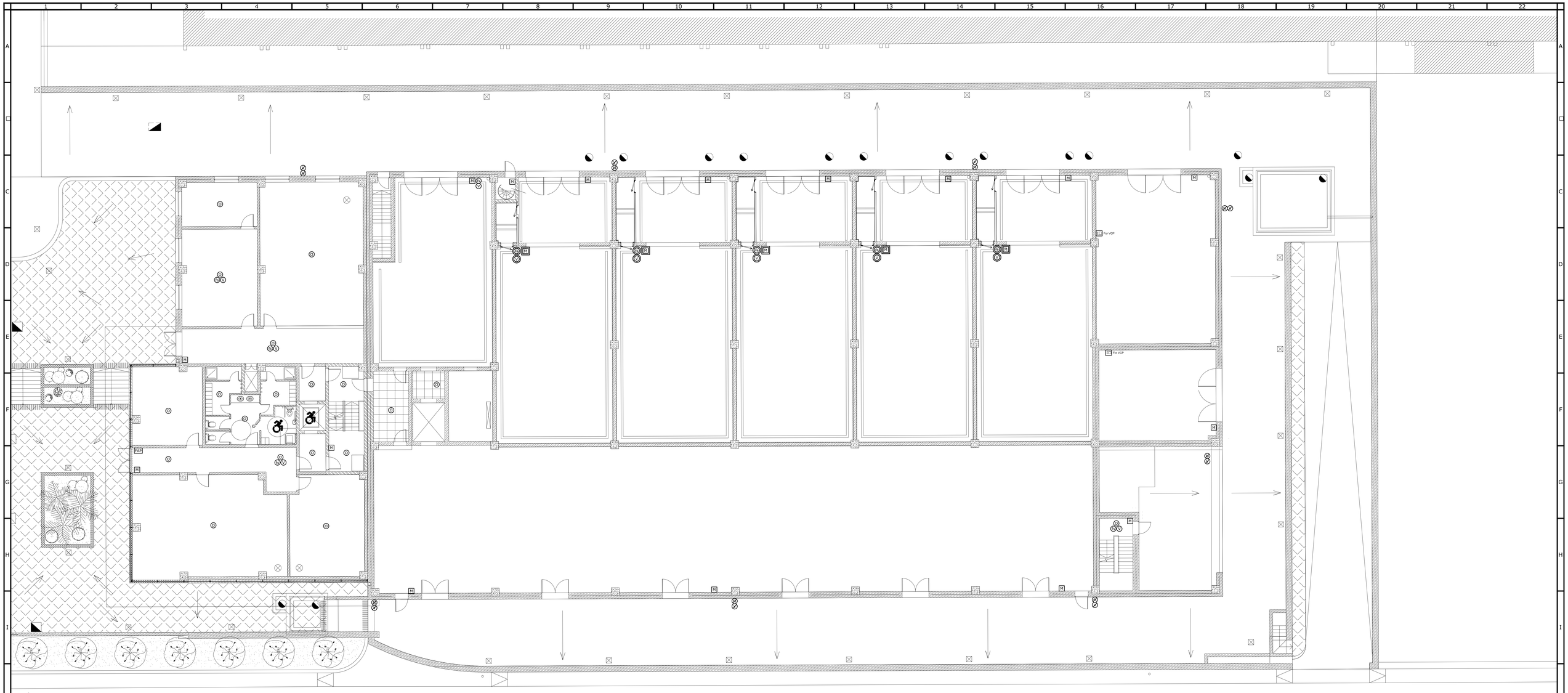
Job No.: 17.019
Drawing No.: STE.0.FD.01
Revision No.: 01
Scale: 1:100
Paper Size: A0
Checked □□
Date: 17.01.18
Drawn □□

Position: Level 0
Service: Fire Detection Installation La□out

Project Name & Address:

Sterling Ltd
New Extension

CAMILLERI & C□SCHIERI
Consulting Engineers
Design Centre, Level 2, Triq It-Torri, Swatar, B'Kara, Malta
Tel: +356 21 226451, +356 21 251797 Fax: +356 21 225741,
Mobile: +356 9949 2960, +356 9945 5495
E-Mail: info@camilleriandcauchieri.com



Fire Detection General Notes:-

1. Cable to □S 6387 CAT CW□shall be used. Cable shall be generall□run surface above false ceiling, clipped to structural ceiling, parallel with the lines of building construction.
2. Proprietar□cable retaining clips and cable glands should be used installed at 300mm intervals.
3. Exact location of fire alarm panel to be determined on site.
4. Exact position of fire detection devices to be coordinated with the soffit installation la□out.
5. Manual call points to be installed at 1200mm from the finished floor level □F.F.L□
6. Loop isolators to be installed in ever□entr□exit from each floor.
7. Combined sounders and beacons shall be preferred.
8. Downdrops shall be minimum Ø25mm conduit.
9. All devices including detectors, call points, remote indicators shall have address fixed onto them. Address shall be printed on self adhersive media □ot hand written□
10. Magnetic door releases to be interfaced with the fire alarm panel.
11. Detectors should not be mounted closer than 500mm from an□obstruction or wall.

Optical Smoke Detector - Installation Onto False Ceiling

Optical Smoke Detector - Installation Onto Slab

Legend:-

	Rate Of Rise Heat Detector
	Optical Smoke Detector
	Internal Fire Sounder
	External Fire Sounder
	Fire Sounder Explosion Proof
	Flashing □acon
	External Flashing □acon
	Flashing □acon Explosion Proof
M	Manual Call Point
M	Manual Call Point Explosion Proof
	Rate Of Rise Heat Detector c/w Sounder and □acon
	Optical Smoke Detector c/w Sounder and □acon
	External Fire Sounder c/w Flashing □acon
	Fire Sounder c/w Flashing □acon
	□eam Transmitter Explosion Proof
	□eam Receiver Explosion Proof
FAP	Fire Alarm Panel
FARP	Fire Alarm Repeater Panel
AUTO	Auto Dailler
	Interface □nit
	Magnetic Door Release

1m 0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m 11m 12m 13m 14m 15m

Scale □ar 1:100

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General Notes and Legends

No.	Date	□□	Revision/Issue
-	-	-	-
-	-	-	-
-	-	-	-

No.	Date	□□	Revision/Issue
-	-	-	-
-	-	-	-
01	05.02.18	AZ	Revised Archeitectural

Job No.: 17.019
Drawing No.: STE.1.FD.01
Revision No.: 01
Scale: 1:100
Paper Size: A0
Checked □□
Date: 17.01.18
Drawn □□

Position: Level 1
Service: Fire Detection Installation La□out

Project Name & Address:

Sterling Ltd
New Extension

CAMILLERI & C□SCHIERI
Consulting Engineers
Design Centre, Level 2, Triq it-Torri, Swatar, B'Kara, Malta
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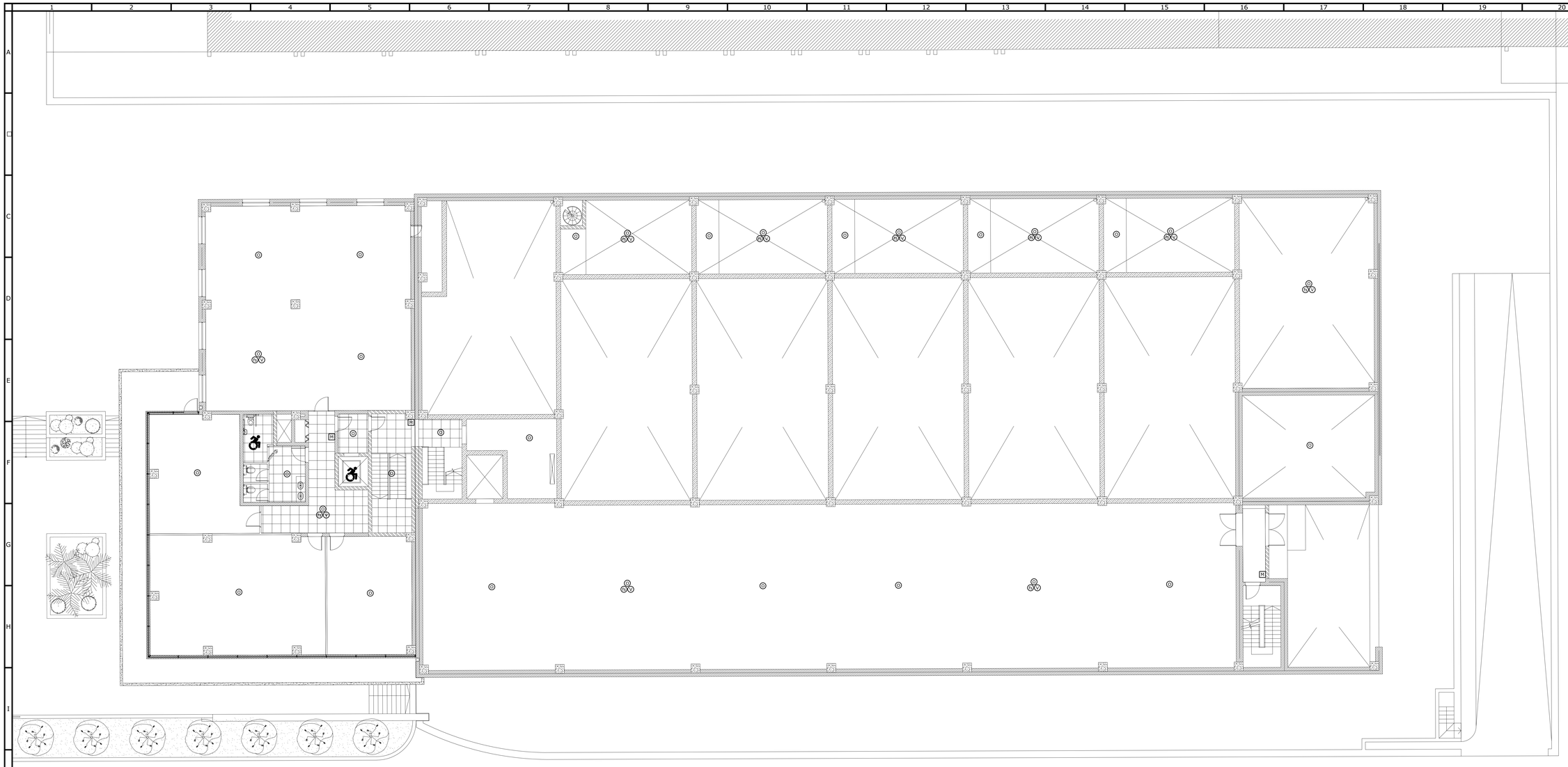
Mobile: +356 9949 2960, +356 9945 5495
E-Mail: info@camilleriandcauchieri.com



Fire Detection General Notes:-

1. Cable to □S 6387 CW□shall be used. Cable shall be generall□run surface above false ceiling, clipped to structural ceiling, parallel with the lines of building construction.
2. Proprietar□cable retaining clips and cable glands should be used installed at 300mm intervals.
3. Exact location of fire alarm panel to be determined on site.
4. Exact position of fire detection devices to be coordinated with the soffit installation la□out.
5. Manual call points to be installed at 1200mm from the finished floor level □F.F.L□
6. Loop isolators to be installed in ever□entr□exit from each floor.
7. Combined sounders and beacons shall be preferred.
8. Downdrops shall be minimum Ø25mm conduit.
9. All devices including detectors, call points, remote indicators shall have address fixed onto them. Address shall be printed on self adhersive media □ot hand written□
10. Magnetic door releases to be interfaced with the fire alarm panel.
11. Detectors should not be mounted closer than 500mm from an□obstruction or wall.

Optical Smoke Detector - Installation Onto False Ceiling

Optical Smoke Detector - Installation Onto Slab

Legend:-

R	Rate Of Rise Heat Detector
O	Optical Smoke Detector
Is	Internal Fire Sounder
Es	External Fire Sounder
Esp	Fire Sounder Explosion Proof
V	Flashing □eacon
Ev	External Flashing □eacon
Evp	Flashing □eacon Explosion Proof
M	Manual Call Point
Mp	Manual Call Point Explosion Proof
R C V	Rate Of Rise Heat Detector c/w Sounder and □eacon
O C V	Optical Smoke Detector c/w Sounder and □eacon
Es Ev	External Fire Sounder c/w Flashing □eacon
Is V	Fire Sounder c/w Flashing □eacon
T	□eam Transmitter Explosion Proof
R	□eam Receiver Explosion Proof
FAP	Fire Alarm Panel
FARP	Fire Alarm Repeater Panel
A□C	Auto Dailler
IU	Interface □it
	Magnetic Door Release

Scale □ar 1:100

PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

No.	Date	□□	Revision/Issue
-	-	.	-
-	-	.	-
.	-	.	-

No.	Date	□□	Revision/Issue
-	-	.	-
-	-	.	-
01	05.02.18	AZ	Revised Architeltcural

Job No.: 17.019	Drawing No.: STE.2.FD.01	Revision No.: 01
Scale: 1:100	Paper Size: A0	Checked □□
Date: 17.01.18	Drawn □□	

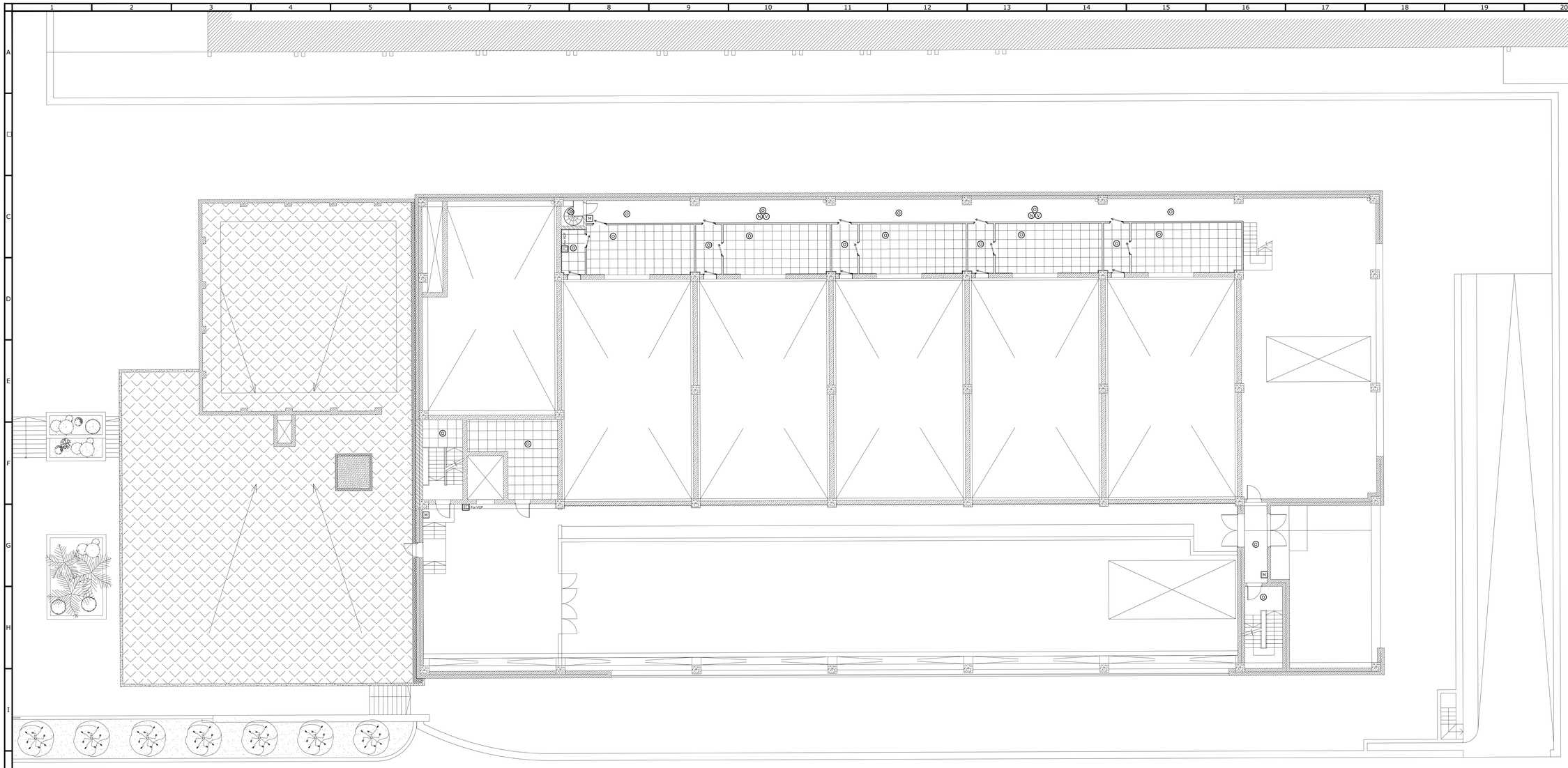
Position: Level 2

Service: Fire Detection Installation La□out

Proj□ct Name & Address:

Sterling Ltd
New Extension

CAMILLERI & C□SCHIERI
Consulting Engineers
Design Centre, Level 2, Triq Ix-Xatt, Swatar, B'Kara, Malta
Tel: +356 21 225611, +356 21 251797 Fax: +356 21 225745,
Mobile: +356 9949 2960, +356 9945 5495
E-Mail: info@camillerieandcuschieri.com



Fire Detection General Notes:-

1. Cable to BS 6387 CAT CWZ shall be used. Cable shall be generally run surface above false ceiling, clipped to structural ceiling, parallel with the lines of building construction.
2. Proprietary cable retaining clips and cable glands should be used installed at 300mm intervals.
3. Exact location of fire alarm panel to be determined on site.
4. Exact position of fire detection devices to be coordinated with the soffit installation layout.
5. Manual call points to be installed at 1200mm from the finished floor level (F.F.L).
6. Loop isolators to be installed in every entry/exit from each floor.
7. Combined sounders and beacons shall be preferred.
8. Downdrops shall be minimum Ø25mm conduit.
9. All devices including detectors, call points, remote indicators shall have address fixed onto them. Address shall be printed on self adhersive media (not hand written)
10. Magnetic door releases to be interfaced with the fire alarm panel.
11. Detectors should not be mounted closer than 500mm from any obstruction or wall.

Optical Smoke Detector - Installation Onto False Ceiling

Optical Smoke Detector - Installation Onto Slab

Legend:-

(H)	Rate Of Rise Heat Detector
(O)	Optical Smoke Detector
(fs)	Internal Fire Sounder
(fs)	External Fire Sounder
(fs)	Fire Sounder Explosion Proof
(V)	Flashing Beacon
(V)	External Flashing Beacon
(V)	Flashing Beacon Explosion Proof
M	Manual Call Point
M	Manual Call Point Explosion Proof
(H) (fs)(V)	Rate Of Rise Heat Detector c/w Sounder and Beacon
(O) (fs)(V)	Optical Smoke Detector c/w Sounder and Beacon
(fs) (V)	External Fire Sounder c/w Flashing Beacon
(fs) (V)	Fire Sounder c/w Flashing Beacon
BT	Beam Transmitter Explosion Proof
BR	Beam Receiver Explosion Proof
FAP	Fire Alarm Panel
FARP	Fire Alarm Repeater Panel
AUTO	Auto Dailler
IU	Interface Unit
▶— —◀	Magnetic Door Release

Scale Bar 1:100

PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

No.	Date	By	Revision/Issue
-	-	-	-
-	-	-	-
-	-	-	-

No.	Date	By	Revision/Issue
-	-	-	-
-	-	-	-
01	05.02.18	AZ	Revised Archeitectural

Job No.: 17.019	Drawing No.: STE.3.FD.01	Revision No.: 01
Scale: 1:100	Paper Size: A0	Checked By
Date: 17.01.18	Drawn By A.Zahra	

Position:
Level 3

Service:
Fire Detection Installation Layout

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Project Name & Address:

Sterling Ltd
New Extension

CAMILLERI & CUSCHIERI
Consulting Engineers
Design Centre, Level 2, Triq it-Torri, Swatar, B'Kara, Malta
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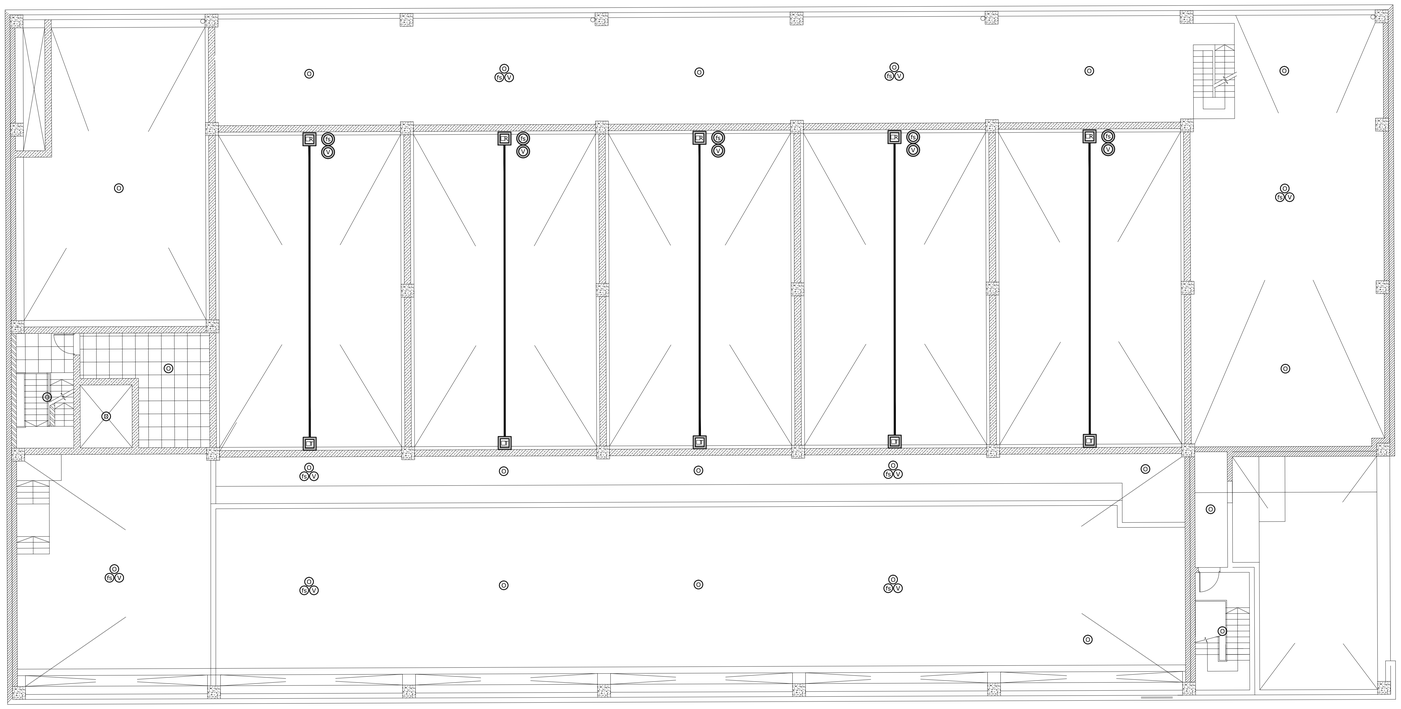
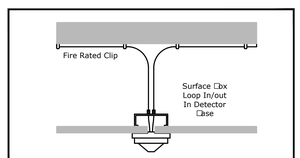
Mobile: +356 9949 2960, +356 9945 5495
E-Mail: info@camilleriandcuschieri.com

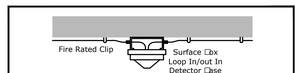


Fire Detection General Notes:-

1. Cable to □S 6387 CAT CW□shall be used. Cable shall be generall□run surface above false ceiling, clipped to structural ceiling, parallel with the lines of building construction.
2. Proprietar□cable retaining clips and cable glands should be used installed at 300mm intervals.
3. Exact location of fire alarm panel to be determined on site.
4. Exact position of fire detection devices to be coordinated with the soffit installation la□out.
5. Manual call points to be installed at 1200mm from the finished floor level □F.F.L□
6. Loop isolators to be installed in ever□entr□exit from each floor.
7. Combined sounders and beacons shall be preferred.
8. Downdrops shall be minimum Ø25mm conduit.
9. All devices including detectors, call points, remote indicators shall have address fixed onto them. Address shall be printed on self adhersive media □ot hand written□
10. Magnetic door releases to be interfaced with the fire alarm panel.
11. Detectors should not be mounted closer than 500mm from an□obstruction or wall.



Optical Smoke Detector - Installation Onto False Ceiling



Optical Smoke Detector - Installation Onto Slab

Legend:-

	Rate Of Rise Heat Detector
	Optical Smoke Detector
	Internal Fire Sounder
	External Fire Sounder
	Fire Sounder Explosion Proof
	Flashing □acon
	External Flashing □acon
	Flashing □acon Explosion Proof
M	Manual Call Point
	Manual Call Point Explosion Proof
	Rate Of Rise Heat Detector c/w Sounder and □acon
	Optical Smoke Detector c/w Sounder and □acon
	External Fire Sounder c/w Flashing □acon
	Fire Sounder c/w Flashing □acon
	□eam Transmitter Explosion Proof
	□eam Receiver Explosion Proof
FAP	Fire Alarm Panel
FARP	Fire Alarm Repeater Panel
A□TO	Auto Dailler
I□	Interface □hit
	Magnetic Door Release

1m 0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m 11m 12m 13m 14m 15m

Scale □ar 1:100

PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

No.	Date	□□	Revision/Issue
-	-	-	-
-	-	-	-
-	-	-	-

No.	Date	□□	Revision/Issue
-	-	-	-
-	-	-	-
01	05.02.18	AZ	Revised Archeitectural

Job No.: 17.019	Drawing No.: STE.3I.FD.01	Revision No.: 01
Scale: 1:100	Paper Size: A0	Checked □□
Date: 17.01.18	Drawn □□ AZ	

Position: Level 3 Intermediate

Service: Fire Detection Installation La□out

Pro□ect Name & Address:

Sterling Ltd
New Extension

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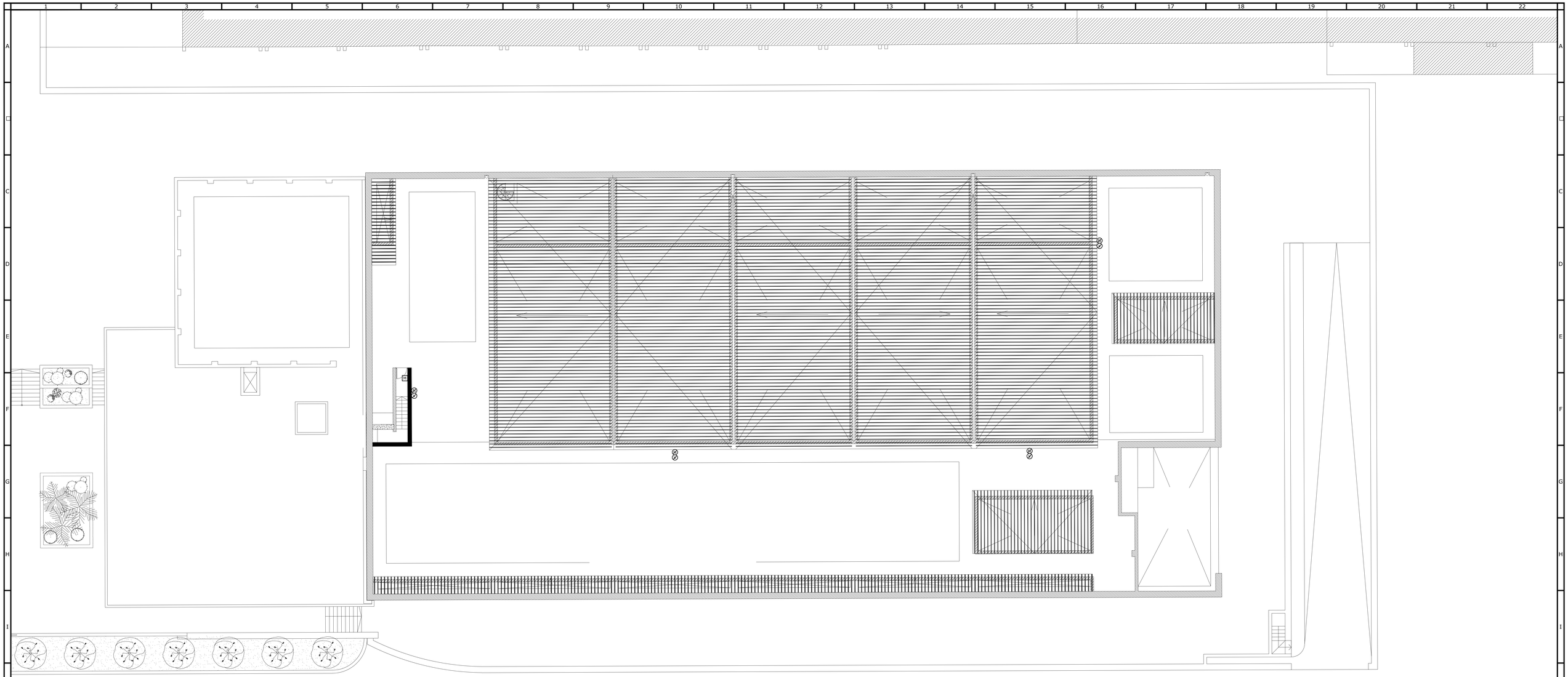
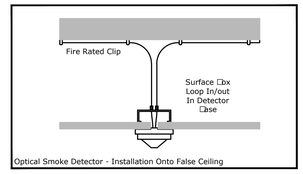
E-Mail: info@camillericonsultant.com

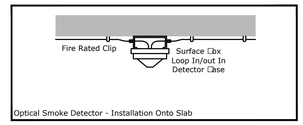


Fire Detection General Notes:-

1. Cable to □S 6387 CAT CW□shall be used. Cable shall be general□run surface above false ceiling, clipped to structural ceiling, parallel with the lines of building construction.
2. Proprietar□cable retaining clips and cable glands should be used installed at 300mm intervals.
3. Exact location of fire alarm panel to be determined on site.
4. Exact position of fire detection devices to be coordinated with the soffit installation la□but.
5. Manual call points to be installed at 1200mm from the finished floor level □F.F.L□
6. Loop isolators to be installed in ever□entr□exit from each floor.
7. Combined sounders and beacons shall be preferred.
8. Downdrops shall be minimum Ø25mm conduit.
9. All devices including detectors, call points, remote indicators shall have address fixed onto them. Address shall be printed on self adhersive media □ot hand written□
10. Magnetic door releases to be interfaced with the fire alarm panel.
11. Detectors should not be mounted closer than 500mm from an□obstruction or wall.



Optical Smoke Detector - Installation Onto False Ceiling



Optical Smoke Detector - Installation Onto Slab

Legend:-

H	Rate Of Rise Heat Detector
O	Optical Smoke Detector
N	Internal Fire Sounder
N	External Fire Sounder
N	Fire Sounder Explosion Proof
V	Flashing □acon
V	External Flashing □acon
V	Flashing □acon Explosion Proof
M	Manual Call Point
M	Manual Call Point Explosion Proof
H N V	Rate Of Rise Heat Detector c/w Sounder and □acon
O N V	Optical Smoke Detector c/w Sounder and □acon
N V	External Fire Sounder c/w Flashing □acon
N V	Fire Sounder c/w Flashing □acon
B	□eam Transmitter Explosion Proof
B	□eam Receiver Explosion Proof
FAP	Fire Alarm Panel
FARP	Fire Alarm Repeater Panel
AUTO	Auto Dailler
I/O	Interface □it
	Magnetic Door Release

1m 0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m 11m 12m 13m 14m 15m

Scale □e► 1:100

PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

No.	Date	□□	Revision/Issue
-	-	-	-
-	-	-	-
-	-	-	-

No.	Date	□□	Revision/Issue
-	-	-	-
-	-	-	-
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Job No.: 17.019	Drawing No.: STE.R.FD.01	Revision No.: 01
Scale: 1:100	Paper Size: A0	Checked □□
Date: 17.01.18	Drawn □□	

Position: Roof Level

Service: Fire Detection Installation La□but

Project Name & Address:

Sterling Ltd
New Extension

CAMILLERI & C□SCHIERI
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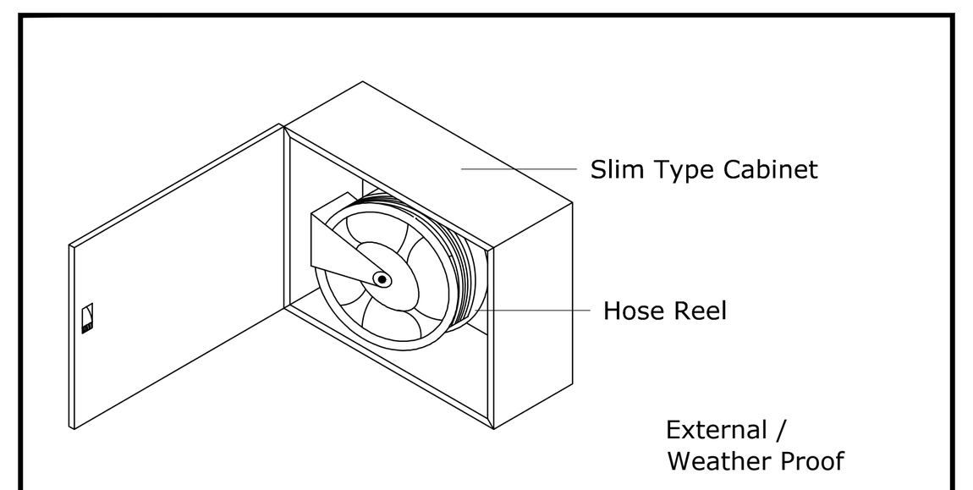
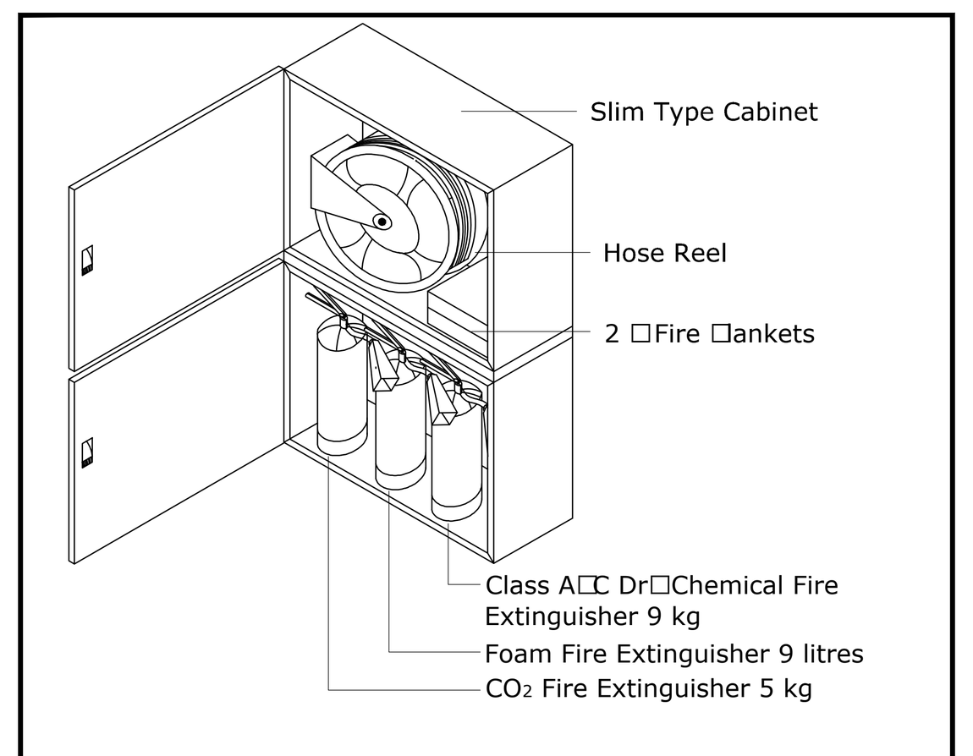
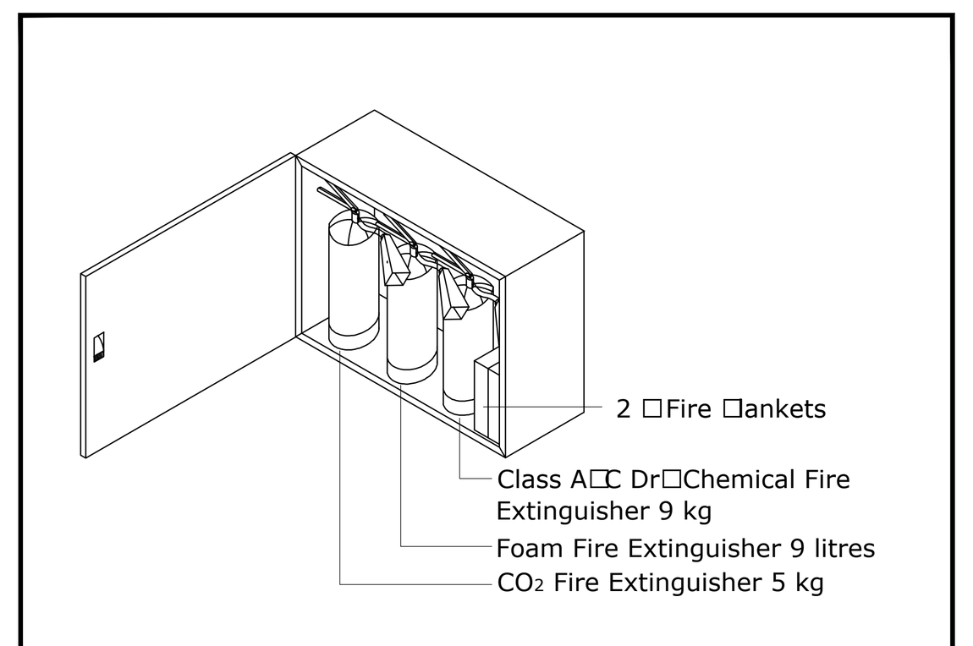
E-Mail: info@camilleriandcuschieri.com



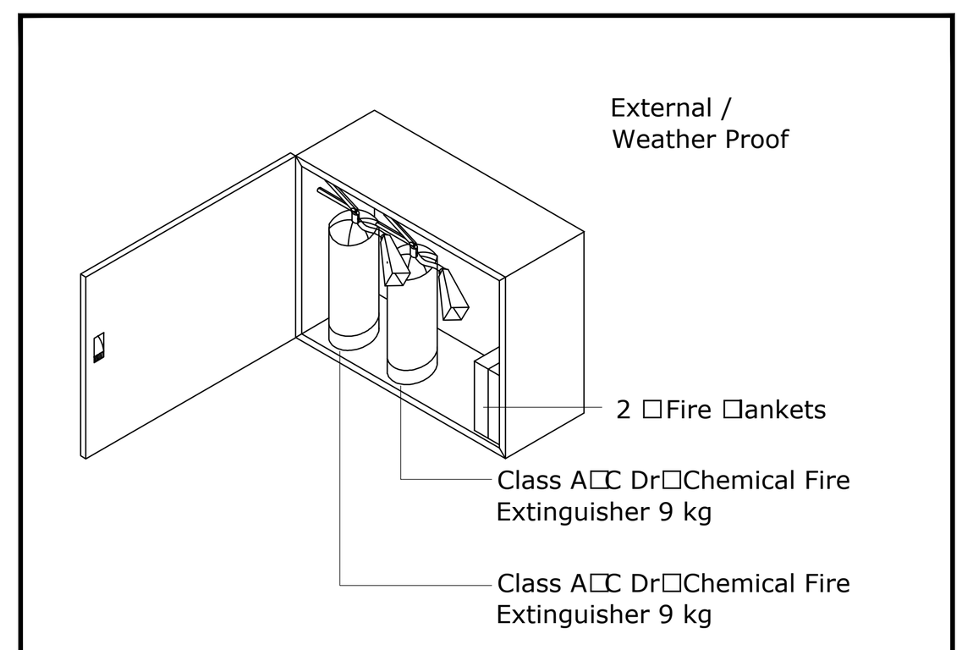
Fire Cabinet Detail "Type A"



Fire Cabinet Detail "Type B"



Fire Cabinet Detail "Type C"



Fire Cabinet Detail "Type D"

Legend:-

Symbol	Description
F/C	Fire Fighting Cabinet
⊠	Breech Point
⋈	Pressure Reducing Landing Valve
—	Fire Fighting Pipe
●	Riser/Drop
DRY (trolley)	Fire Trolley c/w Class ABC Dry Chemical Fire Extinguisher
DRY	Class ABC Dry Chemical Fire Extinguisher 9kg
AFFF	Foam Fire Extinguisher 9 Liters

Fire Fighting General Notes:

1. All emergency escape doors from any area to open outwards.
2. Exact fire fighting pipework route to be coordinated with other services.
3. Exact position of fire cabinets to be coordinated with furniture layout once it is issued by the client.
4. Fire cabinets shall be installed surface or recessed mounted as instructed by client / interior designer team.
5. All pipework crossings are at high level.
6. All fire fighting pipework shall be as follows
   - Main Pipework shall be of 4"
   - Branch pipework feeding both hose reel and landing valve shall be of 2½"
   - Branch pipework feeding landing valve only shall be of 2½"
   - Branch pipework feeding hose reel only shall be of 1"

Scale Bar 1:100

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General Notes and Legends

No.	Date	By	Revision/Issue
01	05.02.18	AZ	Revised Archeitectural

Job No.:	Drawing No.:	Revision No.:
17.019	STE.0.FF.01	01
Scale: 1:100	Paper Size: A0	Checked By
Date: 17.01.18	Drawn By: A.Zahra	

Position: Level 0

Service: Fire Fighting Installation Layout

Project Name & Address:

Sterling Ltd
New Extension

CAMILLERI & CUSCHIERI
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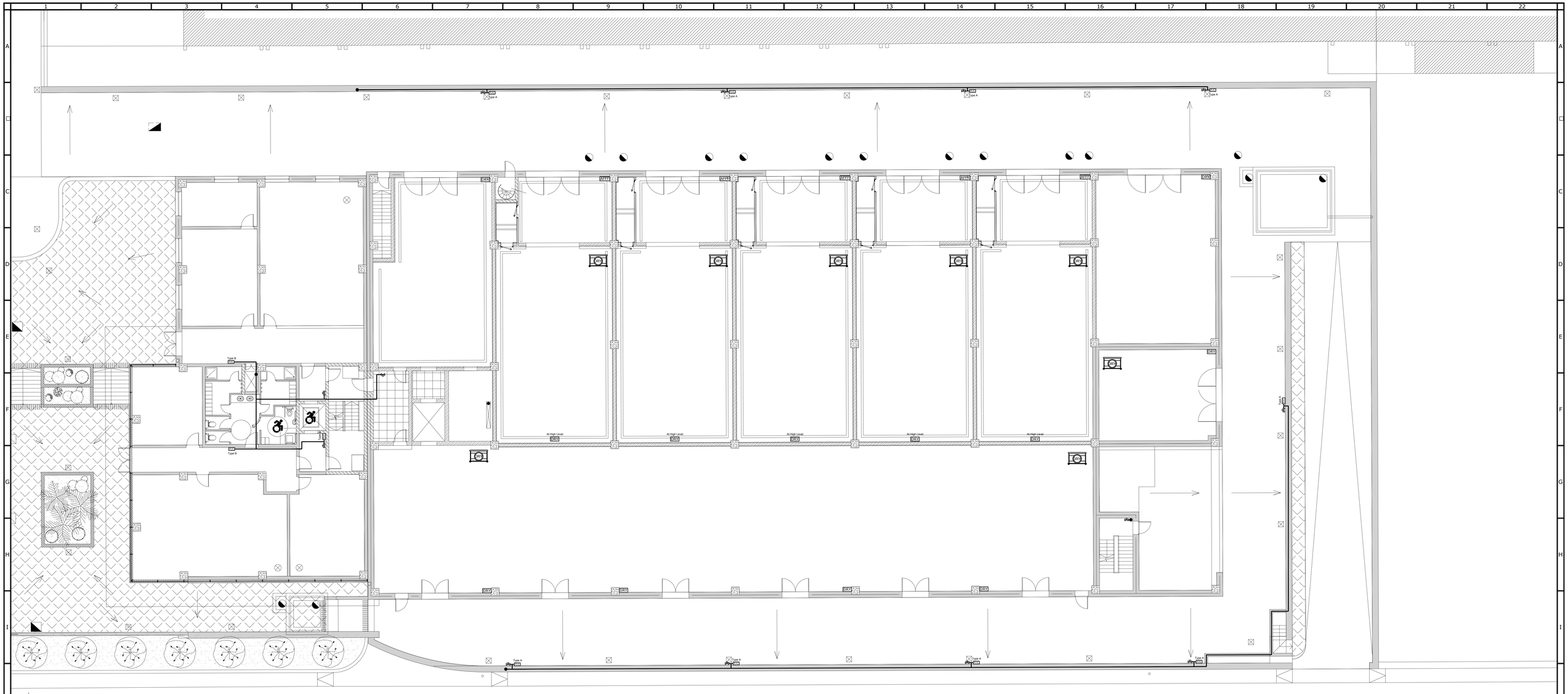
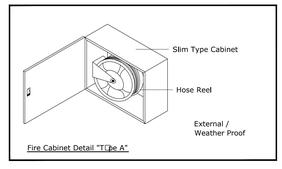
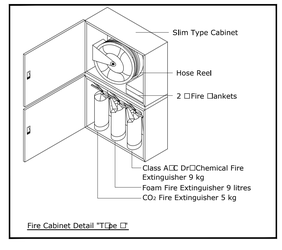
Mobile: +356 9949 2960, +356 9945 5495
E-Mail: info@camilleriandcuschieri.com

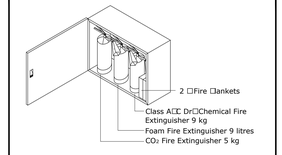




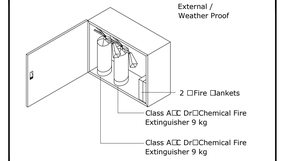
Fire Cabinet Detail "T□pe A"



Fire Cabinet Detail "T□pe □"



Fire Cabinet Detail "T□pe C"



Fire Cabinet Detail "T□pe D"

Legend:-

F/C	Fire Fighting Cabinet
⊠	□eech Point
PRV	Pressure Reducing Landing Valve
——	Fire Fighting Pipe
●	Riser/Drop
	Fire Trolle□c/w Class A□□ Dr□ Chemical Fire Extinguisher
DRY	Class A□□ Dr□Chemical Fire Extinguisher 9kg
AFFF	Foam Fire Extinguisher 9 Liters

Fire Fighting General Notes:

1. All emergenc□escape doors from an□area to open outwards.
2. Exact fire fighting pipework route to be coordinated with other services.
3. Exact position of fire cabinets to be coordinated with furniture la□out once it is issued b□the client.
4. Fire cabinets shall be installed surface or recessed mounted as instructed b□client / interior designer team.
5. All pipework crossings are at high level.
6. All fire fighting pipework shall be as follows
   - Main Pipework shall be of 4"
   - □anch pipework feeding both hose reel and landing valve shall be of 2½"
   - □anch pipework feeding landing valve onl□shall be of 2½"
   - □anch pipework feeding hose reel onl□shall be of 1"

1m 0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m 11m 12m 13m 14m 15m

Scale □ar 1:100

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General Notes and Legends

No.	Date	□□	Revision/Issue
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No.	Date	□□	Revision/Issue
-	-	-	-
-	-	-	-
01	05.02.18	AZ	Revised Archeitectural

Job No.: 17.019
Drawing No.: STE.1.FF.01
Revision No.: 01
Scale: 1:100
Paper Size: A0
Checked □□
Date: 17.01.18
Drawn □□

Position: Level 1
Service: Fire Fighting Installation La□out

Project Name & Address:

Sterling Ltd
New Extension

CAMILLERI & C□SCHIERI
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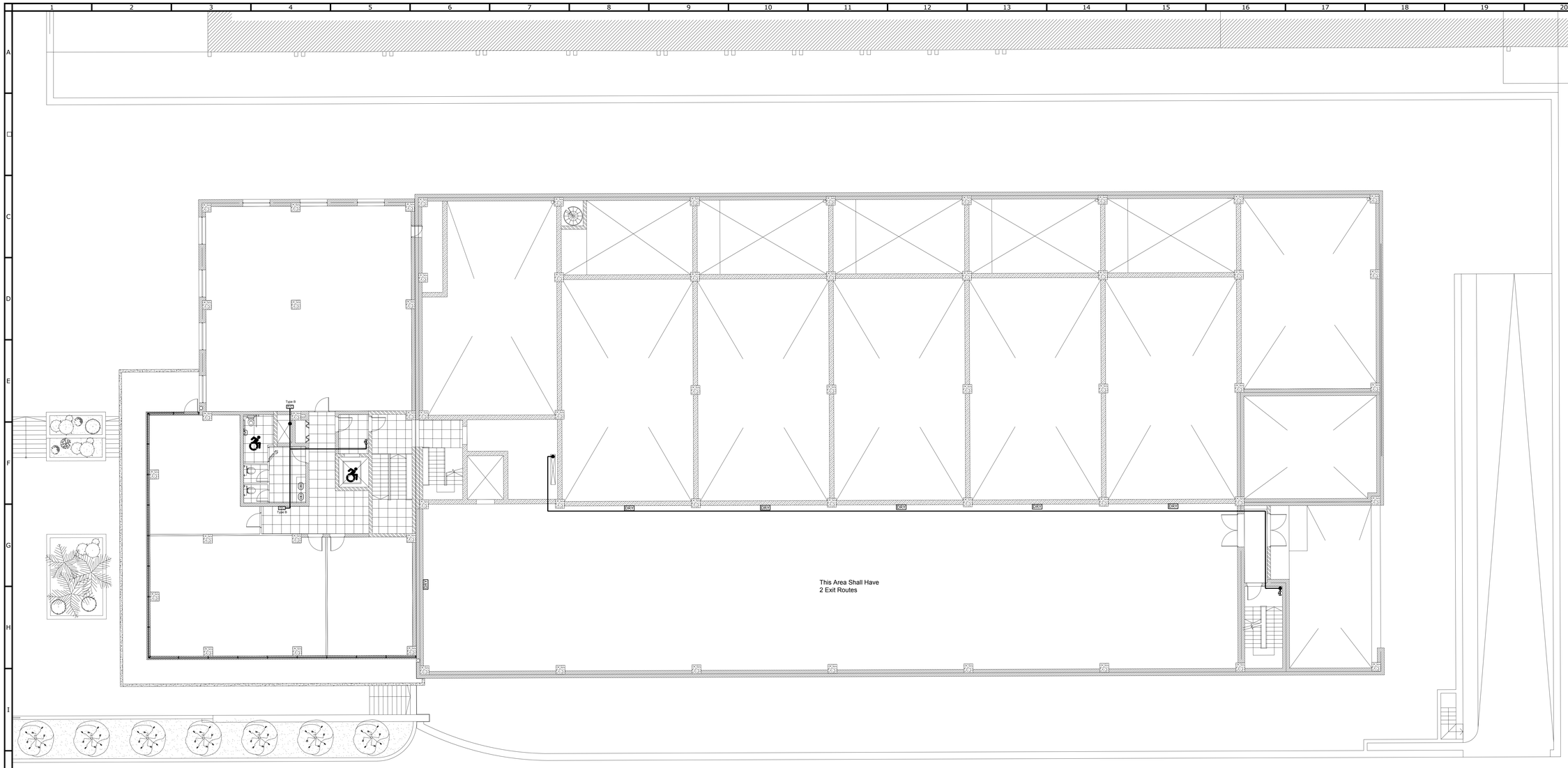
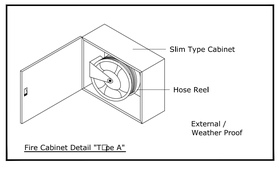
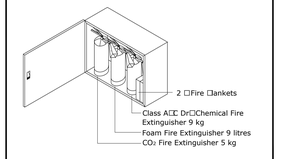
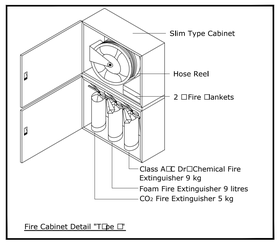




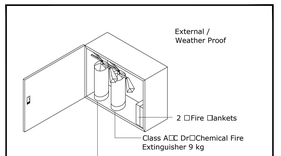
Fire Cabinet Detail "T□pe A"



Fire Cabinet Detail "T□pe C"



Fire Cabinet Detail "T□pe □"



Fire Cabinet Detail "T□pe D"

Legend:-

F/C	Fire Fighting Cabinet
⊠	□reech Point
	Pressure Reducing Landing Valve
	Fire Fighting Pipe
●	Riser/Drop
	Fire Trolle□c/w Class A□□ Dr□ Chemical Fire Extinguisher
DRY	Class A□□ Dr□Chemical Fire Extinguisher 9kg
AFFF	Foam Fire Extinguisher 9 Liters

Fire Fighting General Notes:

1. All emergenc□escape doors from an□area to open outwards.
2. Exact fire fighting pipework route to be coordinated with other services.
3. Exact position of fire cabinets to be coordinated with furniture la□out once it is issued b□the client.
4. Fire cabinets shall be installed surface or recessed mounted as instructed b□client / interior designer team.
5. All pipework crossings are at high level.
6. All fire fighting pipework shall be as follows
   - Main Pipework shall be of 4"
   - □ranch pipework feeding both hose reel and landing valve shall be of 2½"
   - □ranch pipework feeding landing valve onl□shall be of 2½"
   - □ranch pipework feeding hose reel onl□shall be of 1"

1m 0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m 11m 12m 13m 14m 15m

Scale □ar 1:100

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General Notes and Legends

No.	Date	□□	Revision/Issue
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No.	Date	□□	Revision/Issue
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-	-	.	-
01	05.02.18	AZ	Revised Architeltcural

Job No.: 17.019	Drawing No.: STE.2.FF.01	Revision No.: 01	
Scale: 1:100	Paper Size: A0	Checked □□	
Date: 17.01.18	Drawn □□		

Position: Level 2

Service: Fire Fighting Installation La□out

Pro□ect Name & Address:

Sterling Ltd
New Extension

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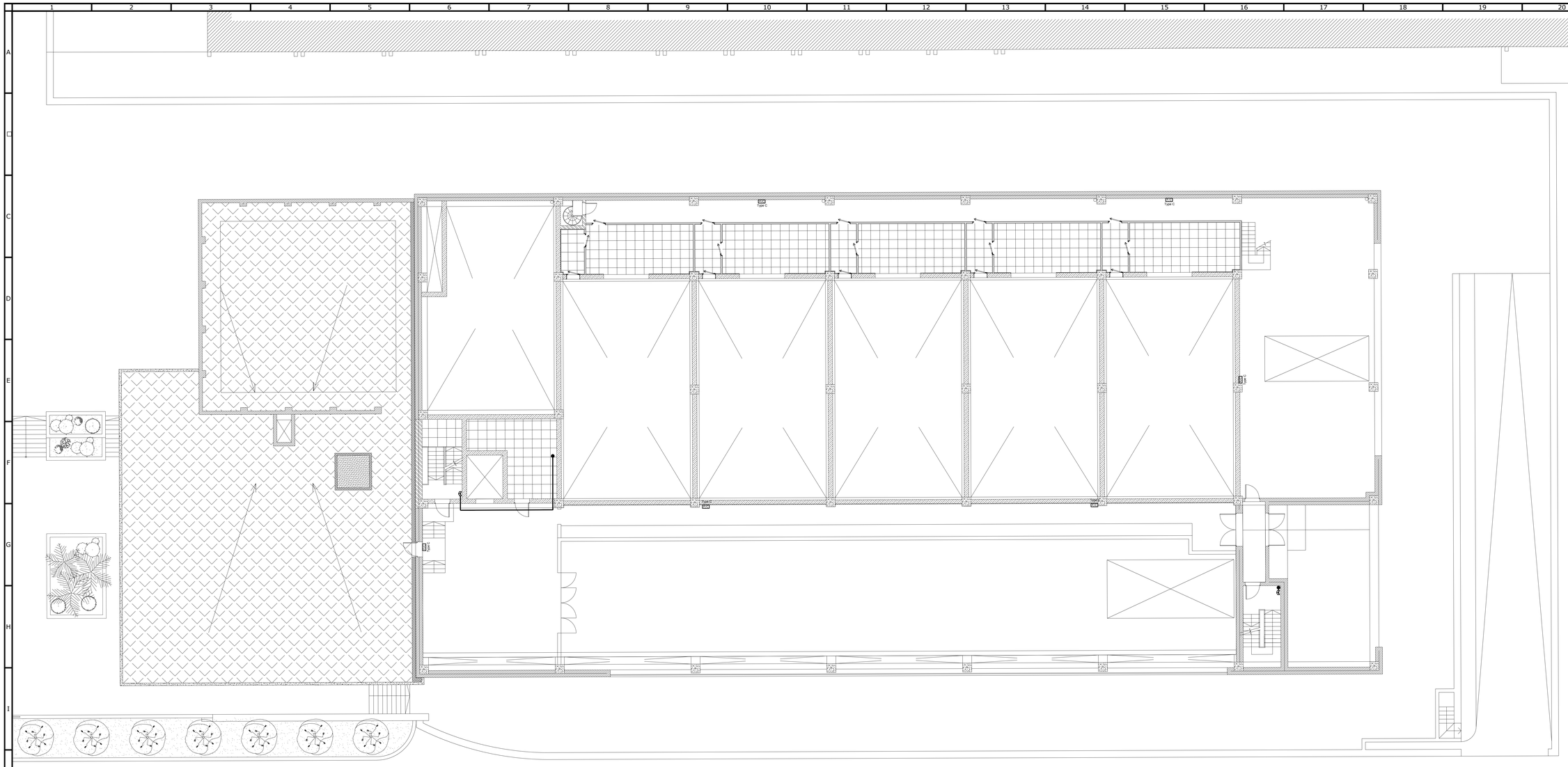
E-Mail: info@camillerieandcoschieri.com



Fire Cabinet Detail "Type A"

Fire Cabinet Detail "Type B"

Fire Cabinet Detail "Type C"

Fire Cabinet Detail "Type D"

Legend:-

F/C	Fire Fighting Cabinet
☒	Breech Point
⋈	Pressure Reducing Landing Valve
—	Fire Fighting Pipe
●	Riser/Drop
DRY	Fire Trolley c/w Class ABC Dry Chemical Fire Extinguisher
DRY	Class ABC Dry Chemical Fire Extinguisher 9kg
AFFF	Foam Fire Extinguisher 9 Liters

Fire Fighting General Notes:

1. All emergency escape doors from any area to open outwards.
2. Exact fire fighting pipework route to be coordinated with other services.
3. Exact position of fire cabinets to be coordinated with furniture layout once it is issued by the client.
4. Fire cabinets shall be installed surface or recessed mounted as instructed by client / interior designer team.
5. All pipework crossings are at high level.
6. All fire fighting pipework shall be as follows
   - Main Pipework shall be of 4"
   - Branch pipework feeding both hose reel and landing valve shall be of 2½"
   - Branch pipework feeding landing valve only shall be of 2½"
   - Branch pipework feeding hose reel only shall be of 1"

1m 0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m 11m 12m 13m 14m 15m

Scale Bar 1:100

PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

No.	Date	By	Revision/Issue
-	-	-	-
-	-	-	-
-	-	-	-

No.	Date	By	Revision/Issue
-	-	-	-
-	-	-	-
01	05.02.18	AZ	Revised Archeitectural

Job No.:	Drawing No.:	Revision No.:
17.019	STE.3.FF.01	01
Scale: 1:100	Paper Size: A0	Checked By
Date: 17.01.18	Drawn By A.Zahra	

Position:
Level 3

Service:
Fire Fighting Installation Layout

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Project Name & Address:

Sterling Ltd
New Extension

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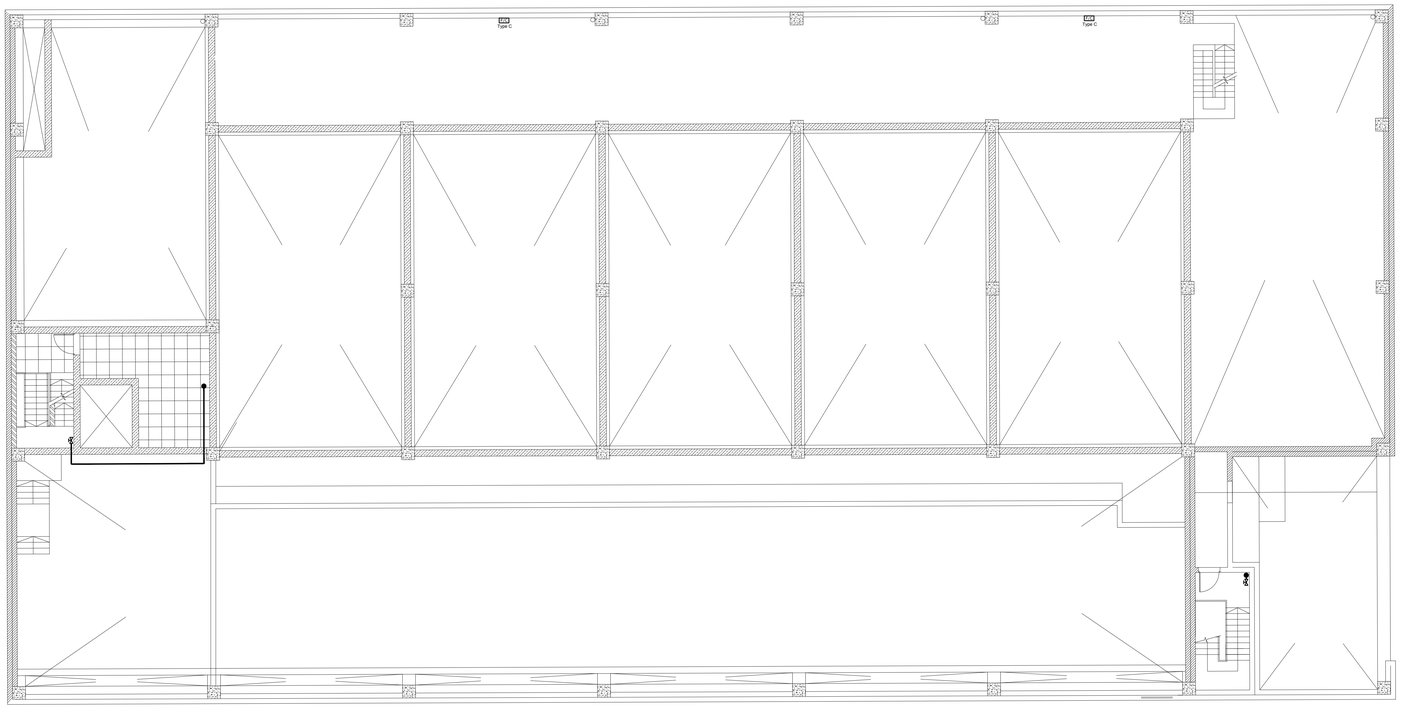
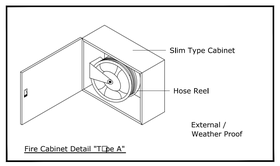
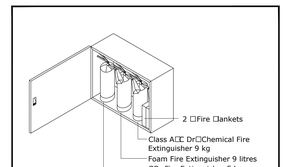
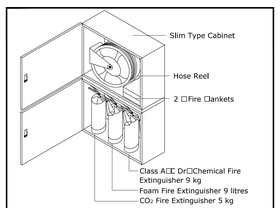




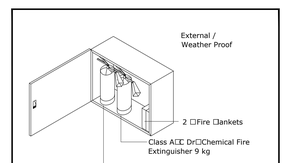
Fire Cabinet Detail "T□pe A"



Fire Cabinet Detail "T□pe C"



Fire Cabinet Detail "T□pe □"



Fire Cabinet Detail "T□pe D"

Legend:-

F/C	Fire Fighting Cabinet
⊠	□reech Point
	Pressure Reducing Landing Valve
	Fire Fighting Pipe
●	Riser/Drop
9KG	Fire Trolle□c/w Class A□□ Dr□ Chemical Fire Extinguisher
9KG	Class A□□ Dr□Chemical Fire Extinguisher 9kg
AFFF	Foam Fire Extinguisher 9 Liters

Fire Fighting General Notes:

1. All emergenc□escape doors from an□area to open outwards.
2. Exact fire fighting pipework route to be coordinated with other services.
3. Exact position of fire cabinets to be coordinated with furniture la□out once it is issued b□the client.
4. Fire cabinets shall be installed surface or recessed mounted as instructed b□client / interior designer team.
5. All pipework crossings are at high level.
6. All fire fighting pipework shall be as follows
   - Main Pipework shall be of 4"
   - □ranch pipework feeding both hose reel and landing valve shall be of 2½"
   - □ranch pipework feeding landing valve onl□shall be of 2½"
   - □ranch pipework feeding hose reel onl□shall be of 1"

1m 0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m 11m 12m 13m 14m 15m

Scale □ar 1:100

PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

No.	Date	□□	Revision/Issue
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No.	Date	□□	Revision/Issue
-	-	-	-
-	-	-	-
01	05.02.18	AZ	Revised Architectural

Job No.:	Drawing No.:	Revision No.:
17.019	STE.3L.FF.01	01
Scale:	Paper Size:	Checked □□
1:100	A0	
Date:	Drawn □□	
17.01.18	AZ Zahra	

Position: Level 3 Intermediate

Service: Fire Fighting Installation La□out

Proj□ct Name & Address:

Sterling Ltd
New Extension

CAMILLERI & C□SCHIERI
Consulting Engineers
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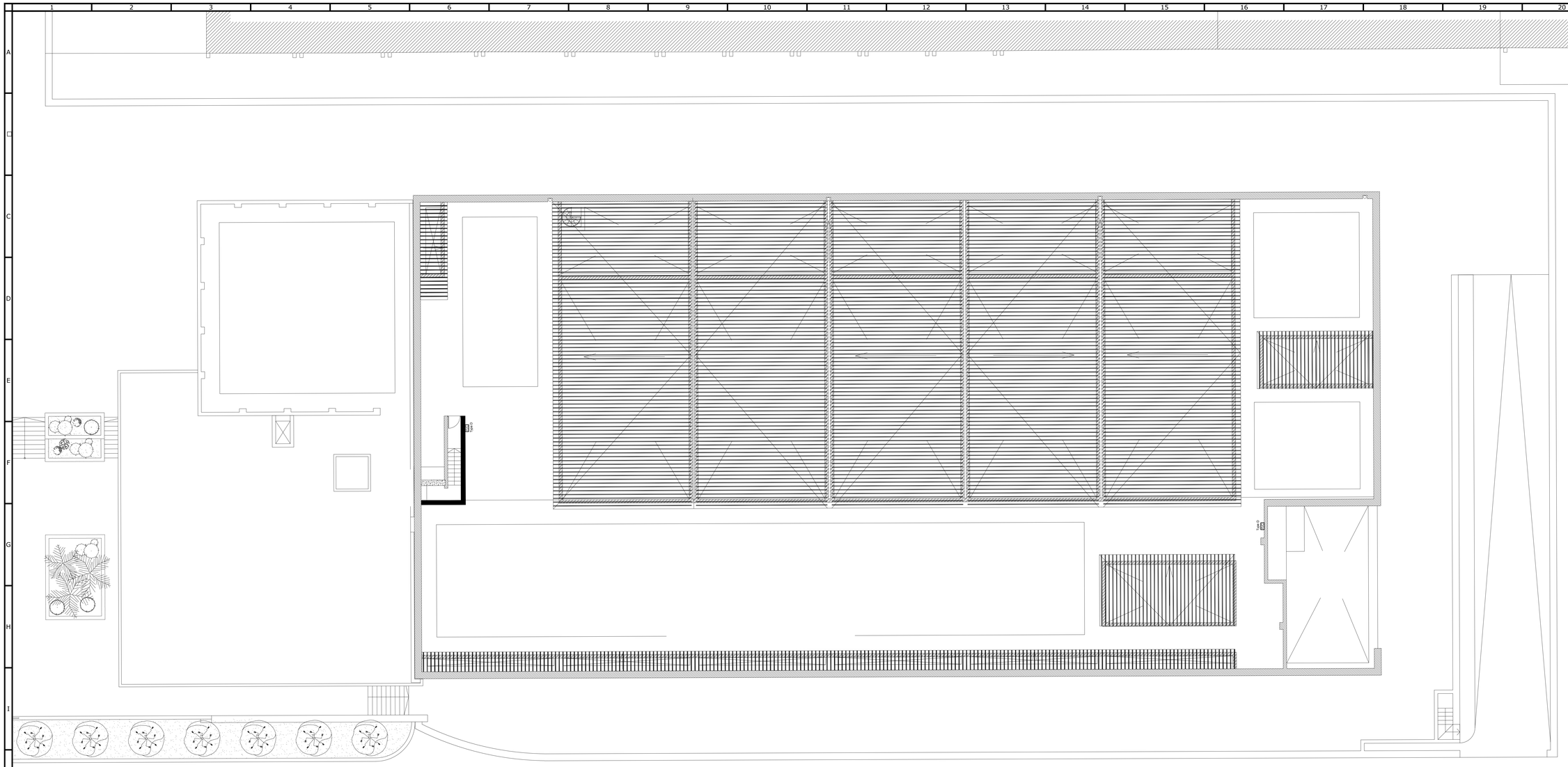
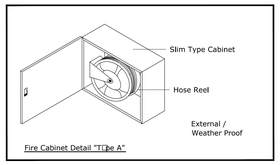
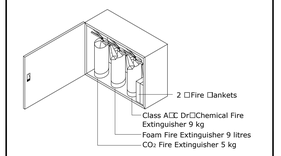
Mobile: +356 9949 2960, +356 9945 5495
E-Mail: info@camillericonsultant.com

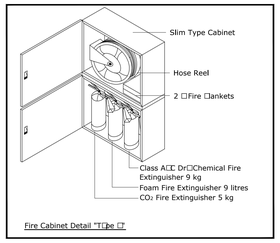




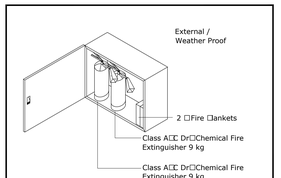
Fire Cabinet Detail "T□pe A"



Fire Cabinet Detail "T□pe C"



Fire Cabinet Detail "T□pe □"



Fire Cabinet Detail "T□pe D"

Legend:-

F/C	Fire Fighting Cabinet
	□eech Point
	Pressure Reducing Landing Valve
	Fire Fighting Pipe
	Riser/Drop
	Fire Trolle□c/w Class A□□ Dr□ Chemical Fire Extinguisher
DRY	Class A□□ Dr□Chemical Fire Extinguisher 9kg
AFFF	Foam Fire Extinguisher 9 Liters

Fire Fighting General Notes:

1. All emergenc□escape doors from an□area to open outwards.
2. Exact fire fighting pipework route to be coordinated with other services.
3. Exact position of fire cabinets to be coordinated with furniture la□out once it is issued b□the client.
4. Fire cabinets shall be installed surface or recessed mounted as instructed b□client / interior designer team.
5. All pipework crossings are at high level.
6. All fire fighting pipework shall be as follows
   - Main Pipework shall be of 4"
   - □anch pipework feeding both hose reel and landing valve shall be of 2½"
   - □anch pipework feeding landing valve onl□shall be of 2½"
   - □anch pipework feeding hose reel onl□shall be of 1"

1m 0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m 11m 12m 13m 14m 15m

Scale □ar 1:100

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General Notes and Legends

No.	Date	□□	Revision/Issue
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No.	Date	□□	Revision/Issue
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-	-	-	-
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Job No.: 17.019	Drawing No.: STE.R.FF.01	Revision No.: 00
Scale: 1:100	Paper Size: A0	Checked □□
Date: 17.01.18	Drawn □□	

Position: Roof Level

Service: Fire Fighting Installation La□out

Proj□ct Name & Address:

Sterling Ltd
New Extension

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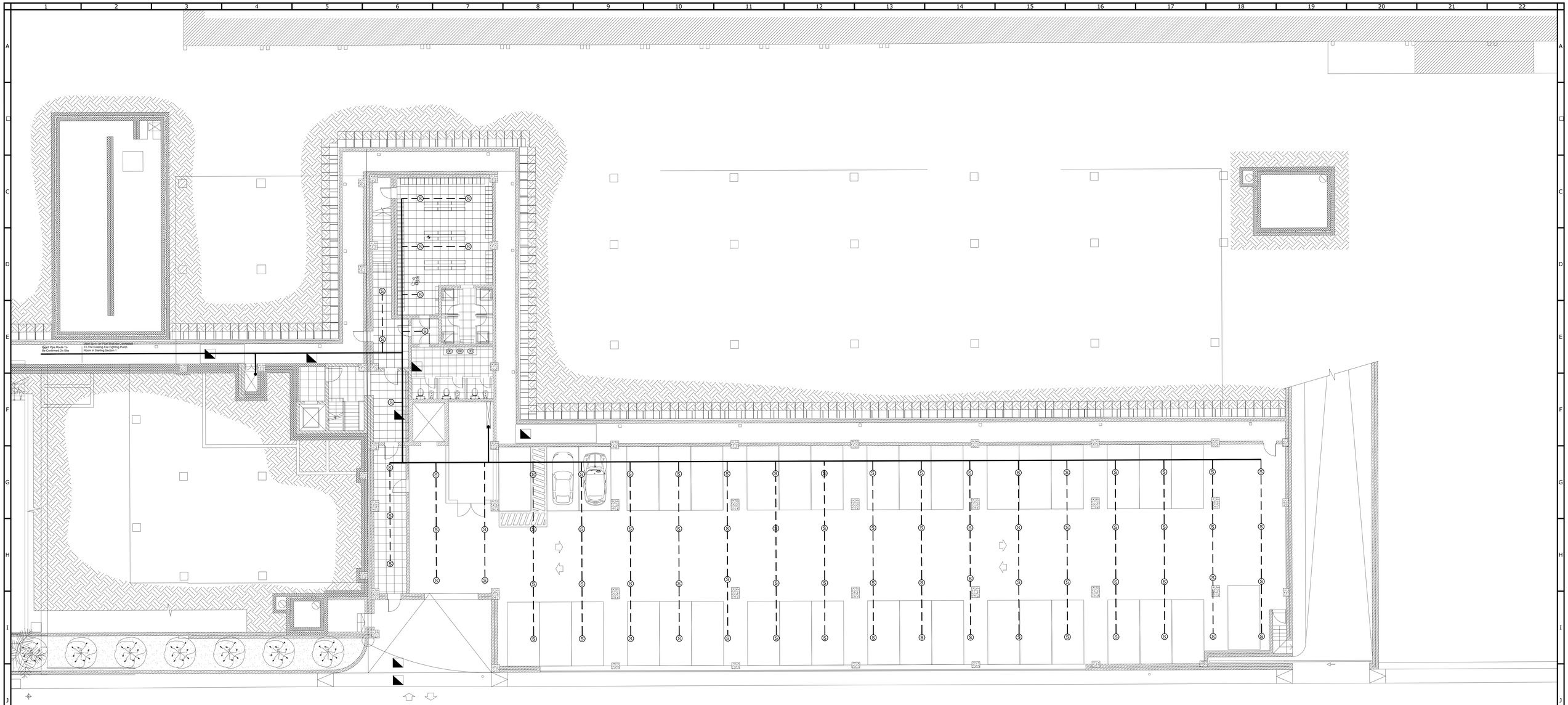

LEGEND:-

Ⓢ	Sprinkler Point
●	Main Riser Pipework
——	Main Pipework
– –	Secondary Pipework

IMPORTANT NOTE:
All pipe sizes shown are indicative. The contractor is to ensure that the pipework and system design is in conformity to the required standards.

1m 0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m 11m 12m 13m 14m 15m

Scale □ar 1:100

PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

No.	Date	□□	Revision/Issue
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No.	Date	□□	Revision/Issue
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01	05.02.18	AZ	Revised Archeitectural

Job No.: 17.019	Drawing No.: STE.0.SPR.01	Revision No.: 01
Scale: 1:100	Paper Size: A0	Checked □□
Date: 17.01.18	Drawn □□ AZ	

Position: Level 0

Service: Sprinkler Installation La□out

Pro□ect Name & Address:

Sterling Ltd
New Extension

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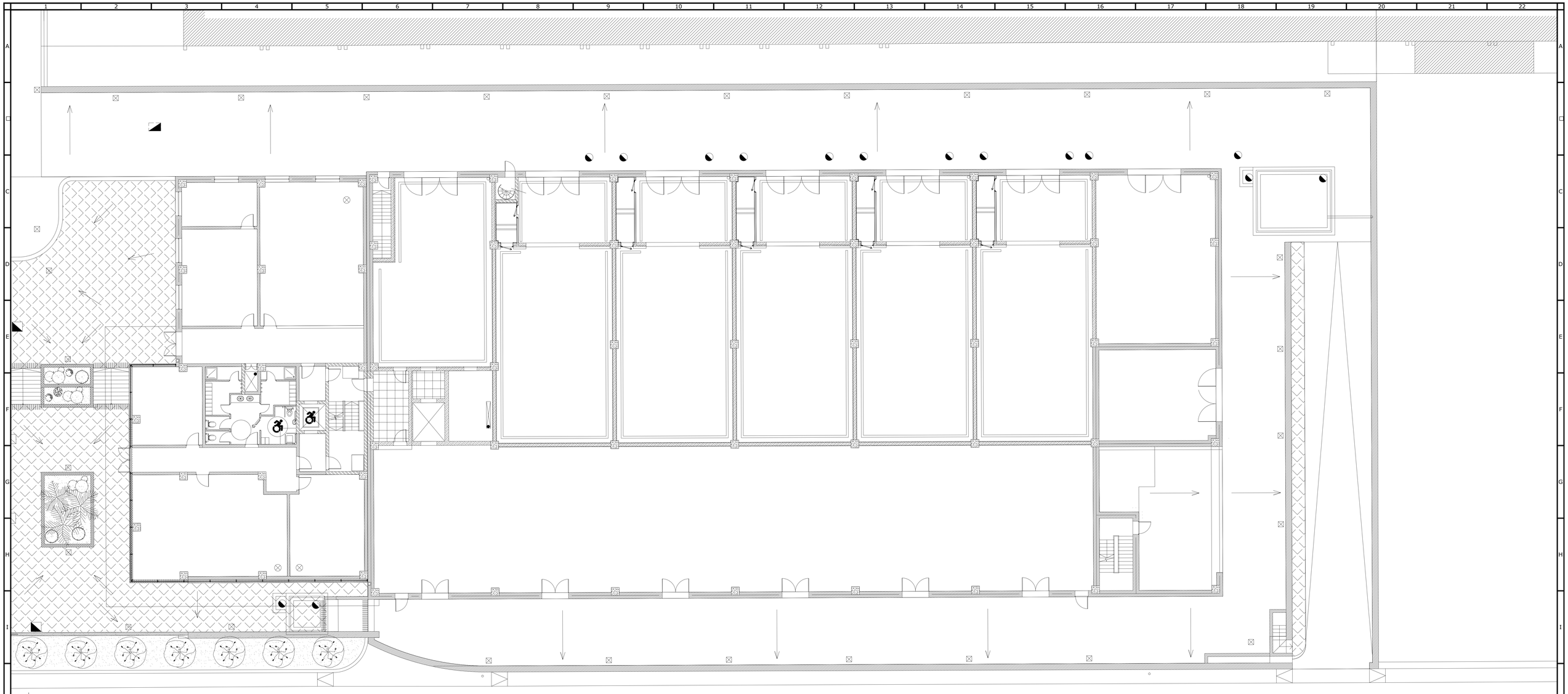

LEGEND:-

S	Sprinkler Point
●	Main Riser Pipework
——	Main Pipework
– –	Secondary Pipework

IMPORTANT NOTE:
All pipe sizes shown are indicative. The contractor is to ensure that the pipework and system design is in conformity to the required standards.

1m 0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m 11m 12m 13m 14m 15m

Scale □ar 1:100

PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

No.	Date	□□	Revision/Issue
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-	-	-	-

No.	Date	□□	Revision/Issue
-	-	-	-
-	-	-	-
01	05.02.18	AZ	Revised Archeitectural

Job No.: 17.019
Drawing No.: STE.1.SPR.01
Revision No.: 01
Scale: 1:100
Paper Size: A0
Checked □□
Date: 17.01.18
Drawn □□

Position: Level 1
Service: Sprinkler Installation La□out

Project Name & Address:

Sterling Ltd
New Extension

CAMILLERI & C□SCHIERI
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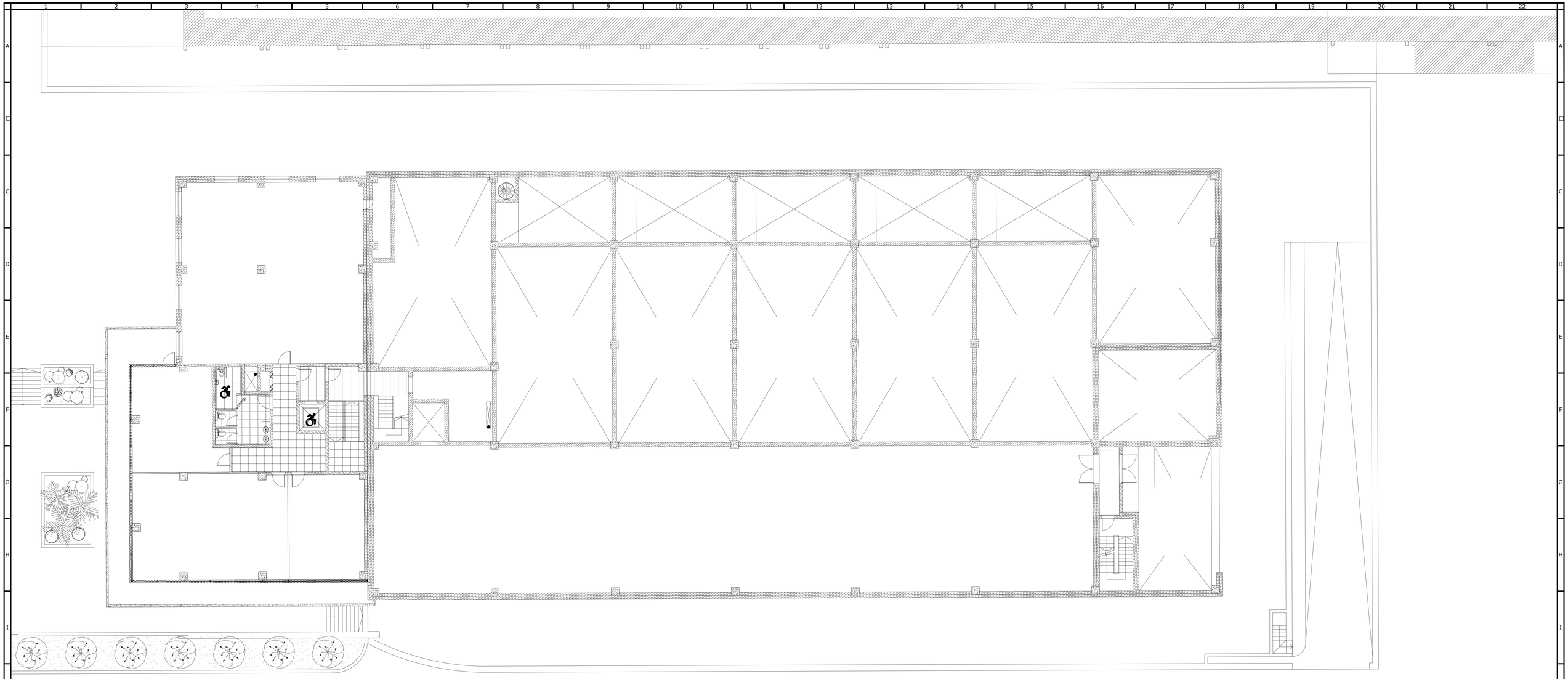

LEGEND:-

Ⓢ	Sprinkler Point
●	Main Riser Pipework
——	Main Pipework
– –	Secondary Pipework

IMPORTANT NOTE:
All pipe sizes shown are indicative. The contractor is to ensure that the pipework and system design is in conformity to the required standards.

1m 0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m 11m 12m 13m 14m 15m

Scale □ar 1:100

PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

No.	Date	□□	Revision/Issue
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-	-	-	-
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No.	Date	□□	Revision/Issue
-	-	-	-
-	-	-	-
01	05.02.18	AZ	Revised Archeitectural

Job No.: 17.019
Drawing No.: STE.2.SPR.01
Revision No.: 01
Scale: 1:100
Paper Size: A0
Checked □□
Date: 17.01.18
Drawn □□ A.Zahit

Position: Level 2
Service: Sprinkler Installation La□out

Pro□ect Name & Address:

Sterling Ltd
New Extension

CAMILLERI & C□SCHIERI
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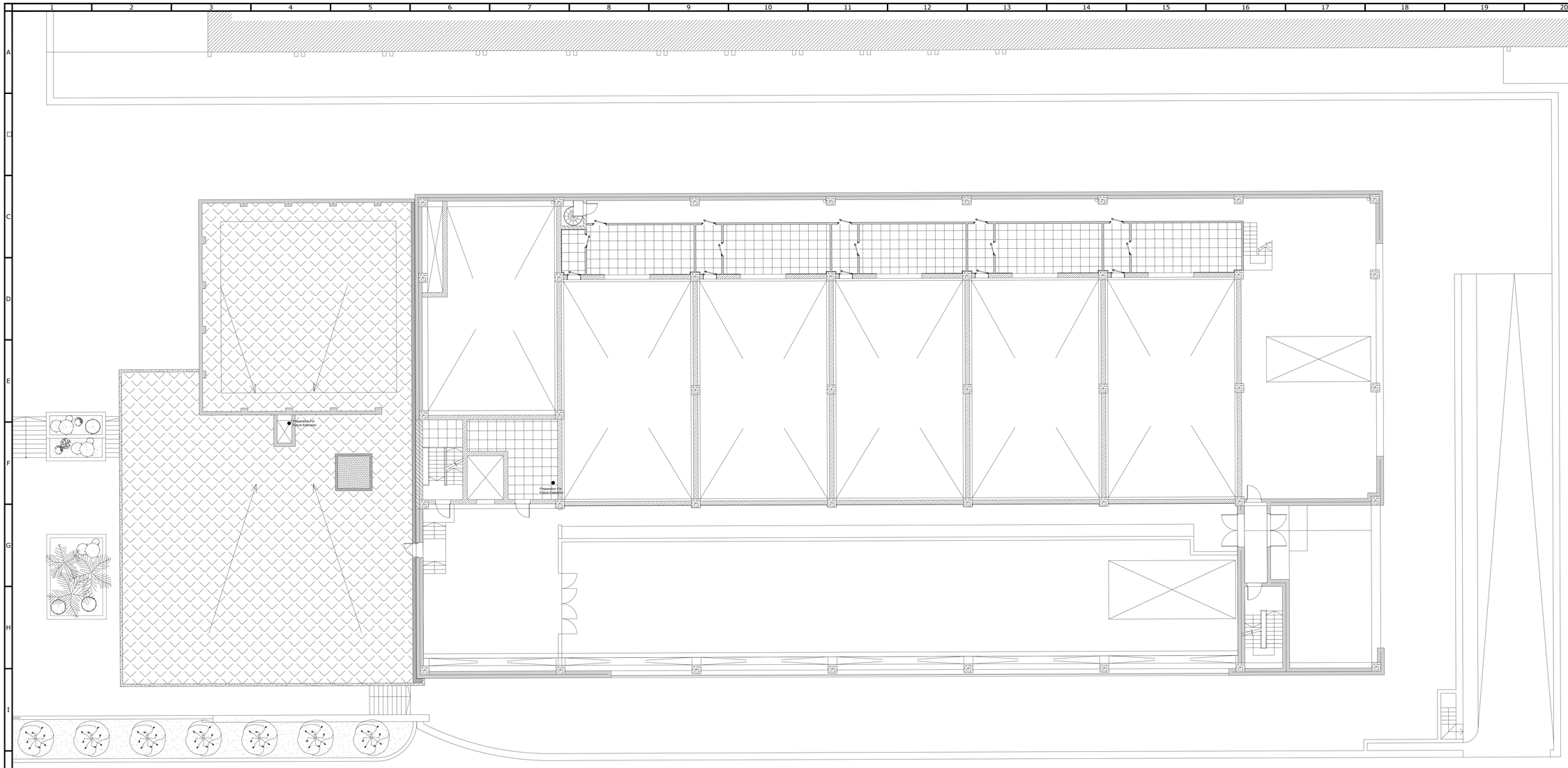

LEGEND:-

S	Sprinkler Point
●	Main Riser Pipework
——	Main Pipework
– –	Secondary Pipework

IMPORTANT NOTE:
All pipe sizes shown are indicative. The contractor is to ensure that the pipework and system design is in conformity to the required standards.

1m 0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m 11m 12m 13m 14m 15m

Scale □ar 1:100

PLEASE DO NOT SCALE FROM THE DRAWING

General Notes and Legends

No.	Date	□□	Revision/Issue
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-	-	-	-
-	-	-	-

No.	Date	□□	Revision/Issue
-	-	-	-
-	-	-	-
01	05.02.18	AZ	Revised Archeitectural

Job No.: 17.019
Drawing No.: STE.3.SPR.01
Revision No.: 01
Scale: 1:100
Paper Size: A0
Checked □□
Date: 17.01.18
Drawn □□

Position: Level 3
Service: Sprinkler Installation La□out

Pro□ect Name & Address:

Sterling Ltd
New Extension

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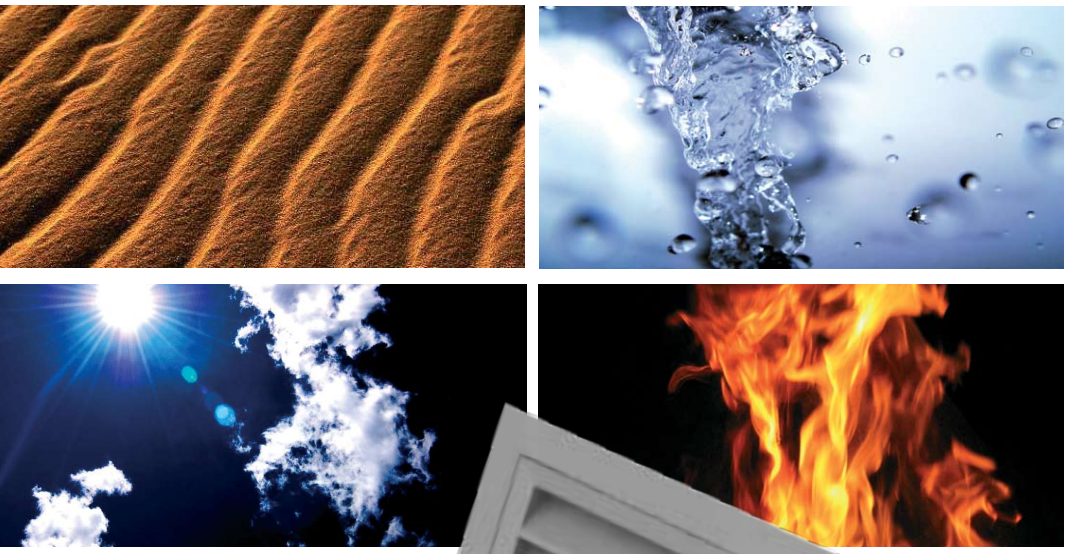
Annex 3: General ventilation grille

tecno-ventil
components for air-conditioning systems

1-7.0-04.00-E-02/07



AFA/M - Return air grilles with inclined fins and filter

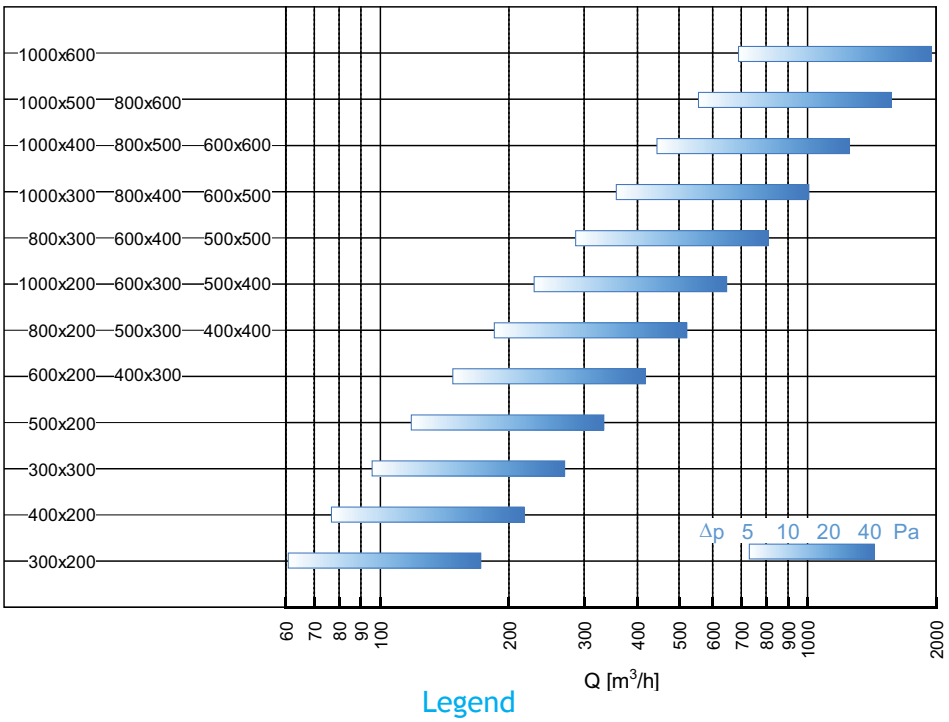
AFA/M Return air grilles with inclined fins and filter

Versions

- *AFA/M (alluminio estruso)*

The AFA/M series of return air grilles with fixed horizontally inclined fins with a pitch of 25 mm complete with filtering unit and “push-push” closing system have been designed to be installed in the interior of buildings for the return or the circulation of air, for small or medium airflow rates. The special shape of the fins also allows their use externally for the collection of fresh air, ventilation or the expulsion of stale air. The opening/closing click system is easy and compact to use by pushing the central part of the grille, which opens around the knuckle joints while the external counter frame hold steady. The AFA/M occurs without outstanding knobs and the strength of the system allows also a ceiling installation without risks of accidental release.

Quick reference selection table



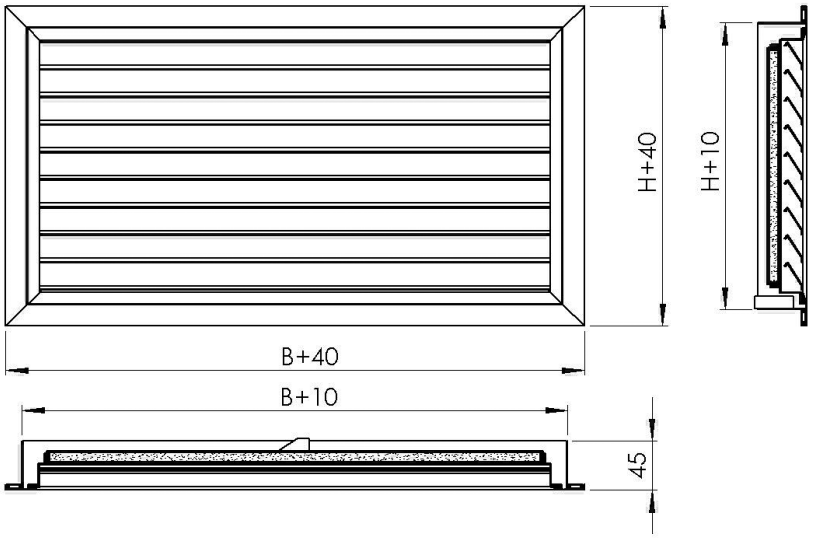
Legend

Q [m³/h] o [l/s]	return air flow rate
BxH [mm]	nominal dimensions of the grille
Δp [Pa]	pressure loss

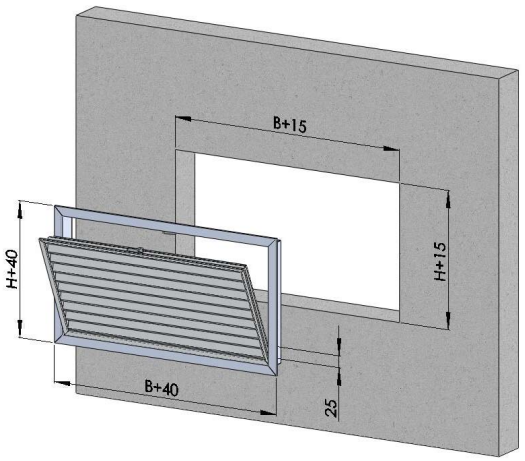
VER. 18/02/10

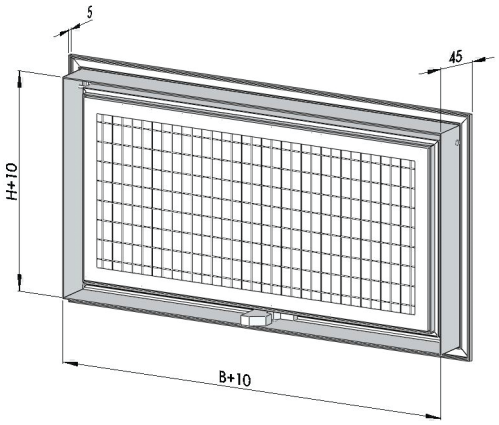
Dimensions

Section Dimensions



3D Dimensions





Construction

Standard construction of, the AFA/M series of grilles involves the use of natural anodised extruded aluminium.

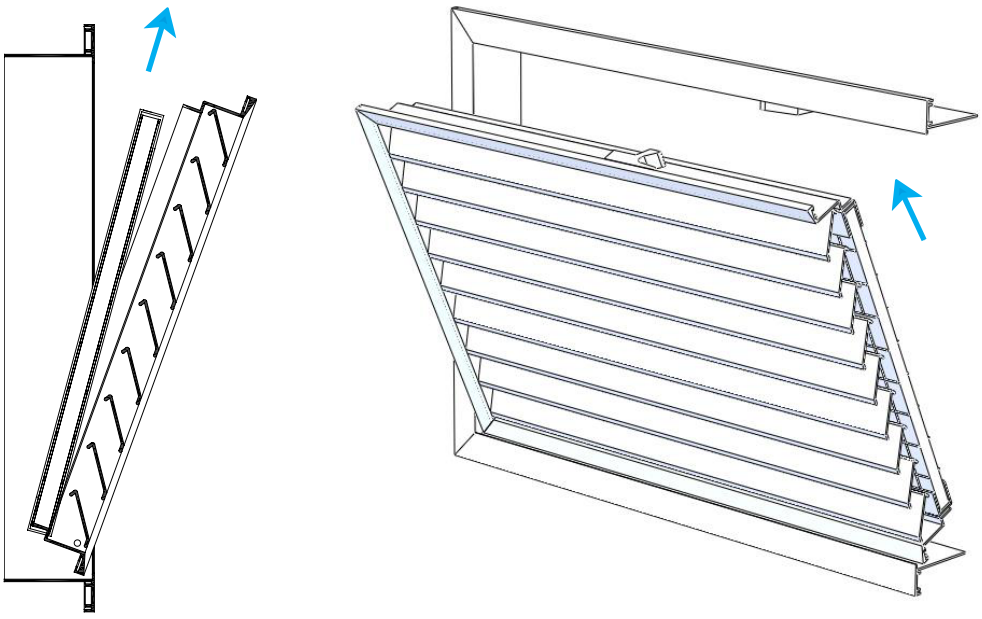
Standard dimensions:

- For B from a minimum of 300 mm to a maximum of 1000 mm in increments of 50 mm
- For H from a minimum of 200 mm to a maximum of 600 mm in increments of 50 mm

For non-standard sizes please contact our technical office

VER. 18/02/10

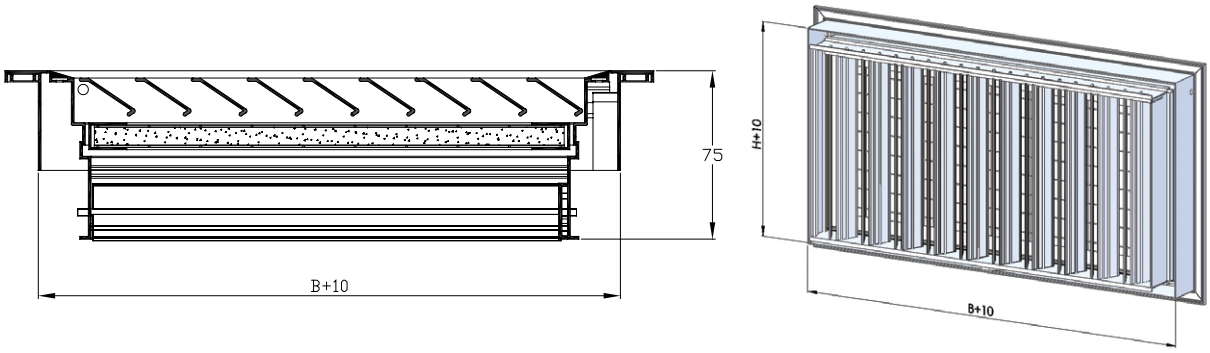
Extraction of filter and opening



The opening/closing click system push-push type lets to open easily and quickly the central part of the grille, which rotates around the knuckle joints while the external counter frame hold steady, allowing an easier and compact extraction of the filter for the maintenance, the lot without knobs or other outstanding or visible parts.

Accessories

SC - opposed blade regulating damper



AFA/M with a counter-moving damper and fins parallel to the short side, made entirely of aluminium, operable by means of a screw-driver from the front part of the grille; on request it is possible to install either a proportional or an on/off servomotor.

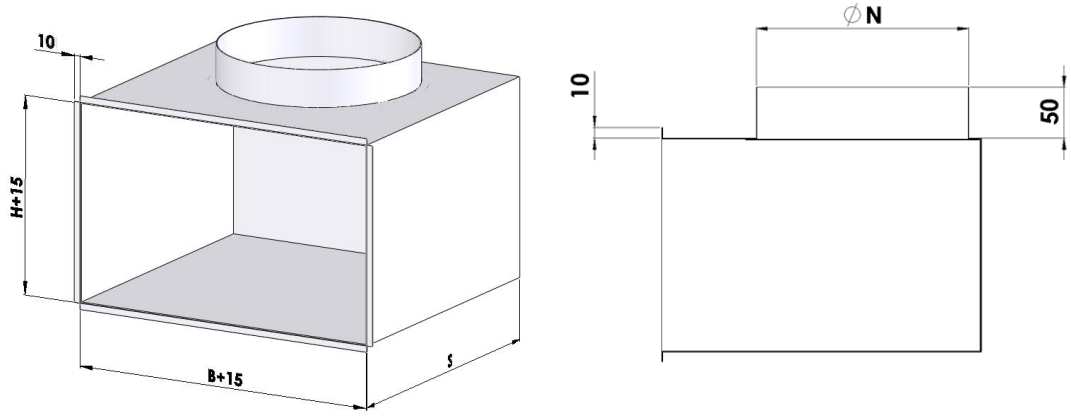
Counterframes

CTC: counterframe for fitting onto ducts, made of Sendzimir zinc plated steel, (for the dimensions please see the “Fixing systems” section).

CTM: counterframe for fitting onto walls, made of Sendzimir zinc plated steel, (for the dimensions please see the “Fixing systems” section).

N.B. The sizes of the standard counterframes (CTC and CTM) must be (B+15)x(H+15)

PS1-PSI1 plenum boxes

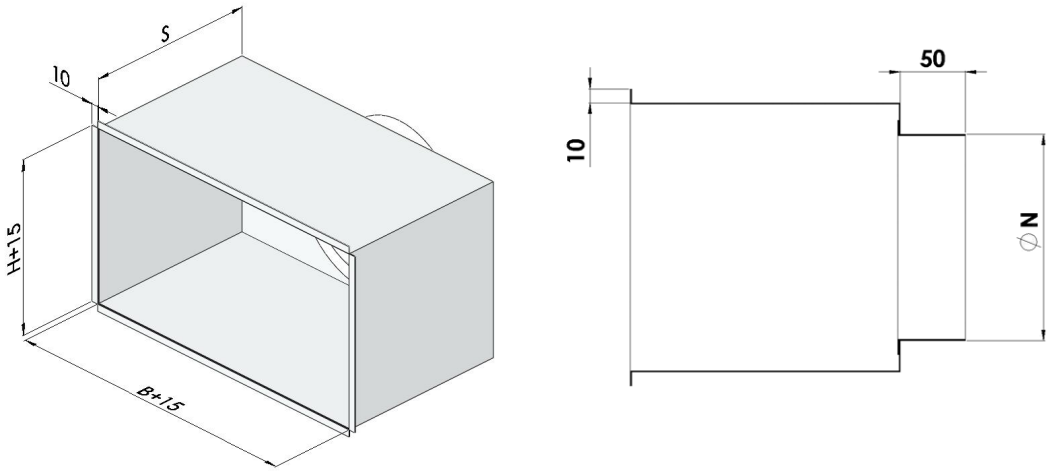


PS1-Standard plenum box made of Sendzimir zinc plated steel with side connection.

PSI1-Plenum box insulated with class 1 certified material (Ministerial Decree 26-6-1984 Article 8) made of Sendzimir zinc plated steel with side connection.

N.B. The sizes of the standard plenum boxes PS1 and PSI1 for the grilles with filter holders (AFA/M, BMQA/M, ...) must be (B+15)x(H+15)

PS2-PSI2 plenum boxes



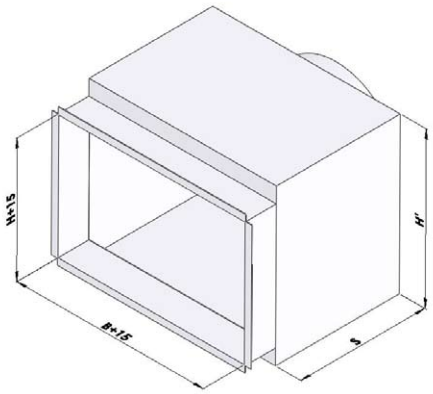
PS2-Standard plenum box made of Sendzimir zinc plated steel with rear connection.

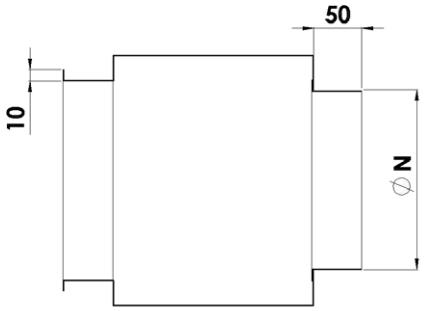
PSI2-Plenum box insulated with class 1 certified material (Ministerial Decree 26-6-1984 Article 8) made of Sendzimir zinc plated steel with rear connection.

N.B. The sizes of the standard plenum boxes PS2 and PSI2 for the grilles with filter holders (AFA/M, BMQA/M, ...) must be (B+15)x(H+15)

VER. 18/02/10

PS2M-PSI2M plenum boxes





PS2M-Standard plenum box made of Sendzimir zinc plated steel with rear connection.

PSI2M-Plenum box insulated with class 1 certified material (Ministerial Decree 26-6-1984 Article 8) made of Sendzimir zinc plated steel with rear connection.

N.B. The sizes of the standard plenum boxes PS2M and PSI2M for the grilles with filter holders (AFA/M, BMQA/M, ...) must be (B+15)x(H+15)

Plenum box dimensions

PS1 - PS2M

ØN	100	160	200	250	315	350	400
S	200	260	300	350	415	450	500
H'	150	210	250	300	365	400	450
BxH	200x100	300x100	500x100	800x100	800x150	900x200	900x300
	250x100	350x100	600x100	900x100	900x150	1000x200	1000x300
		400x100	300x150	1000x100	1000x150	500x300	800x400
		200x150	350x150	500x150	600x200	600x300	
		250x150	400x150	600x150	700x200	700x300	
		200x200	250x200	700x150	800x200	800x300	
			300x200	400x200	400x300	500x400	
				500x200		600x400	

PS2

ØN	100	125	160	250	No. connections
S	200	200	200	200	
BXH	200x100	300x150	250x200	400x300	1
	250x100	350x150	300x200	500x300	
		400x150	400x200		
	300x100	500x150	500x200		2
	350x100	600x150	600x200		
	400x100		700x200		
	500x100		800x200		
	600x100				
	700x100	700x150			3
	800x100	800x150			
	900x100				
	1000x100				
		900x150			4
		1000x150			

Technical data

Effective outlet area

The effective outlet area is a notional area that, once the velocity of the air is known, makes it possible to arrive at the rate of flow that is actually passing through the grille. The measurement is carried out with an instrument that measures the velocity of the air at various points between the fins. The formula that links the various parameters is as follows:

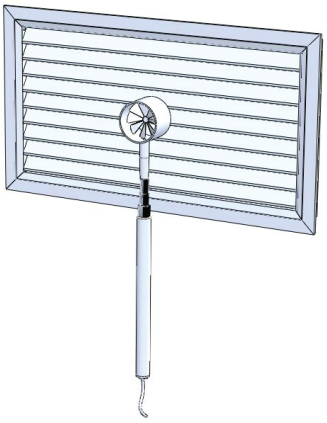
$$Q = v_k \times S \times 3600$$

where

Q = supply air flow rate [m^3/h]

V_k = velocity relating to S [m/s]

S = effective outlet area [m^2]



H/B	300	400	500	600	800	1000
200	• 0,035	• 0,048	• 0,06	• 0,073	0,098	0,123
300	0,055	• 0,074	• 0,094	• 0,114	• 0,153	• 0,192
400	0,074	0,101	• 0,128	• 0,154	0,207	0,260
500	0,094	0,128	• 0,161	• 0,195	0,262	0,329
600	0,114	0,154	0,195	0,235	0,316	0,397

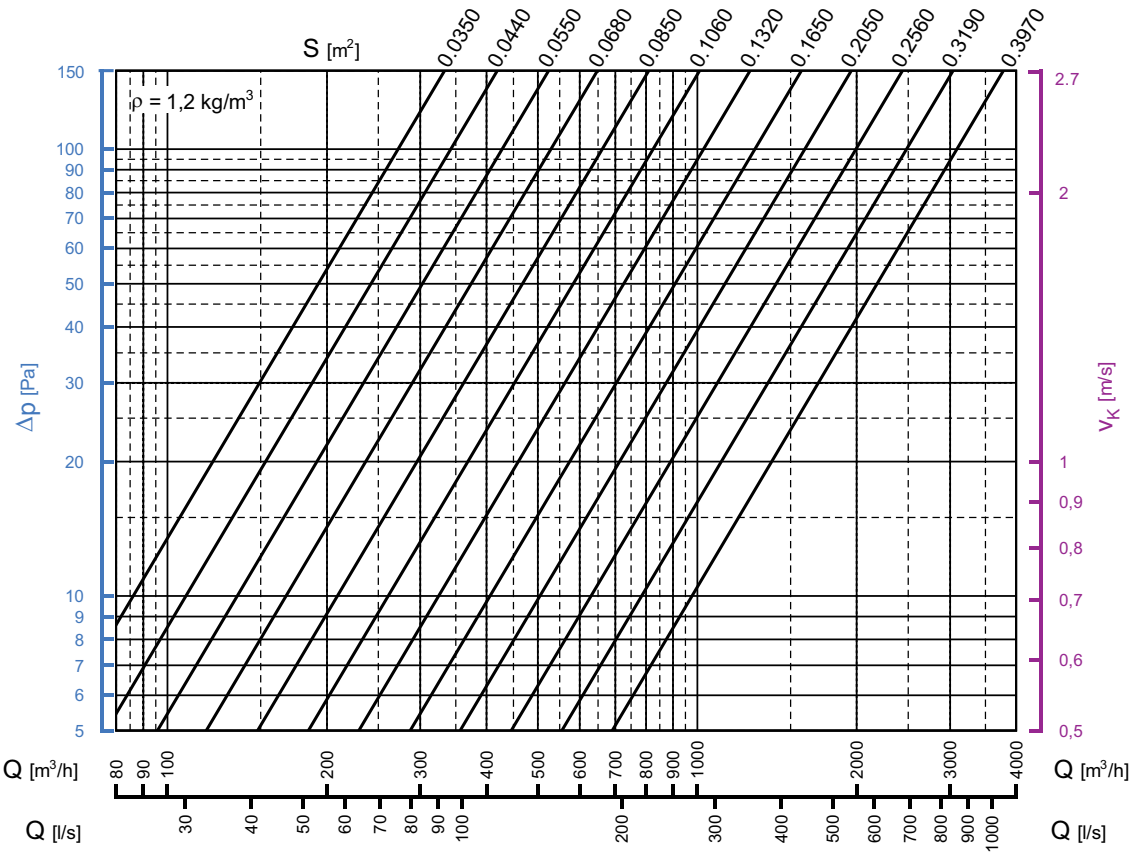
• Standard sizes available from stock

Weights (kg)

H/B	300	400	500	600	800	1000
200	0,8	1,0	1,2	1,3	1,7	2,0
300	1,0	1,3	1,5	1,7	2,1	2,6
400	1,3	1,5	1,8	2	2,6	3,1
500	1,5	1,8	2,1	2,4	3,0	3,6
600	1,7	2,0	2,4	2,7	3,4	4,1

VER. 18/02/10

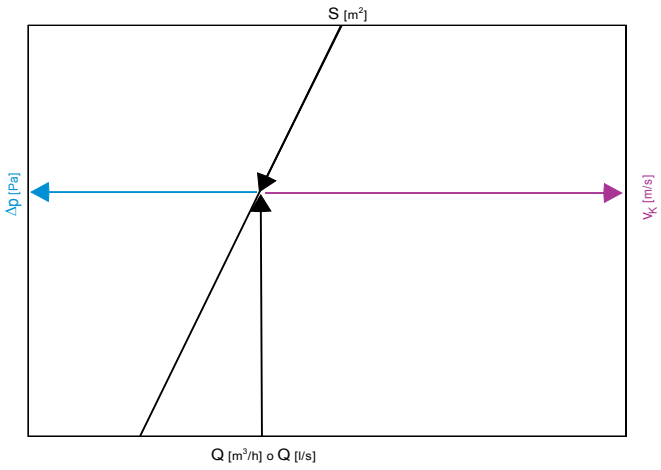
Pressure loss



Legend

Q [m³/h]	supply air flow rate
S [m²]	effective outlet area
v_k [m/s]	velocity relating to the effective outlet area S
Δp [Pa]	total pressure loss

Graphical operating chart

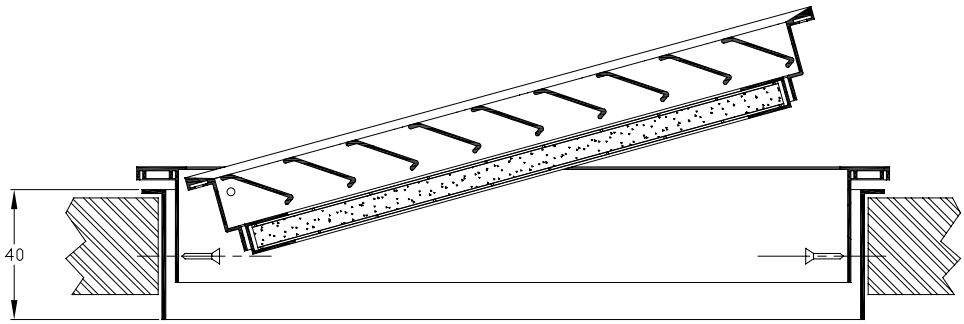


Fixing systems

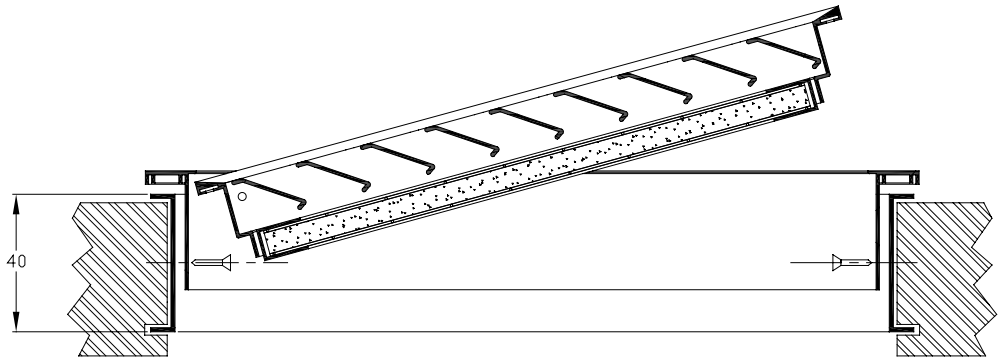
Type of fixing

Fixing of AFA/M grilles is carried out by means of screws into the intern counterframe.

CTC- Fixing with screws



CTM- Fixing with screws



Installazione

Installation on rectangular ducting:

1-Make a hole in the ducting size (B+15) (H+15)

2-Insert into the hole in the ducting a counterframe of the same size as the hole and secure it with screws or rivets

3-Secure the grille with screws

Wall installation with a plenum box:

1-Make a hole in the wall size (B+15) (H+15)

2-Embed the plenum box flush with the wall

3-Secure the grille with screws

VER. 18/02/10

tecno-ventil
componenti per impianti di climatizzazione

tecno-ventil s.p.a.
Via Parma, 2
26016 Spino d'Adda (CR)
Tel. +39 0373.980456
Fax +39 0373.980681
www.tecnoventil.com
info@tecnoventil.com

Annex 4: HEPA filter specification sheets

EMCEL Filters Limited
Blatchford Road | Horsham | West Sussex | United Kingdom | RH13 5RA
Tel: (01403) 253215 | Fax: (01403) 259881
Email: info@emcelfilters.co.uk | Web: www.emcelfilters.co.uk

CERTIFICATE OF CONFORMITY

Batch No. 47235.01

Customer:	Nuova Guseo s.r.l.
Order No:	1372
Drawing No:	E2234-40 Gr135 Issue 1
Description:	Cylindrical Leaf Seal HEPA Filter
Customer Ref:	CFE-H14-197D0300L-/RIF.CO.L59/CE (2 off) CFE-H14-197D0300L-/RIF.CO.L70/CE (3 off)
Serial No:	47235-01-01 to 47235-01-05
Quantity:	5 off

have been tested and/or inspected in accordance with the conditions and requirements of the contract or Purchase Order and unless otherwise noted conform in all respects to the specification(s) and drawing(s) relevant thereto.

Signed:

Print Name: Mr J D Robson

Authorised by:

Print Name: Mr R Clark

Date: 09 February 2018

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CERTIFICATE OF CONFORMITY

Batch No. 47235.03

Customer:	Nuova Guseo s.r.l.
Order No:	1372
Drawing No:	E2234-40 Gr134 Issue 1
Description:	Cylindrical Leaf Seal HEPA Filter
Customer Ref:	CFE-H14-236D0375L-/RIF.CO.L59/CE (1 off) CFE-H14-236D0375L-/RIF.CO.L70/CE (1 off)
Serial No:	47235-03-01 to 47235-03-02
Quantity:	2 off

have been tested and/or inspected in accordance with the conditions and requirements of the contract or Purchase Order and unless otherwise noted conform in all respects to the specification(s) and drawing(s) relevant thereto.

Signed:

Print Name: Mr J D Robson

Authorised by:

Print Name: Mr R Clark

Date: 09 February 2018

EMCEL Filters Limited
Blatchford Road | Horsham | West Sussex | United Kingdom | RH13 5RA
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Email: info@emcelfilters.co.uk | Web: www.emcelfilters.co.uk

CERTIFICATE OF TEST

Customer: Nuova Guseo s.r.l.

This is to certify that the item manufactured to your

Order No: 1372

Drawing No: E2234-40 Gr135 Issue 1

Product Description: Cylindrical Leaf Seal HEPA Filter

EMCEL Batch No: 47235.01

Serial No: 47235-01-02

Has been volumetrically tested to BS EN ISO 14644 Part 3 using an aerosol of Ondina oil

Aerosol Airflow Test Rate	74 cfm
Type Of Aerosol	Thermally generated poly dispersed ondina el oil
Challenge	32 µg/l
Penetration	0.0031 %
Efficiency	99.9969 %
Tested By	A. Macias
Date of Test	08/02/18
Instrument No	Smoke Generator P636, Photometer P685
Required Efficiency	99.995 %
Pass/Fail	PASS

Signed

Mr J D Robson
Quality Assurance Manager

Original to customer, copy to be retained by EMCEL Filters Limited. Details of results will be filed by batch number and held for 3 years.

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Tel: (01403) 253215 | Fax: (01403) 259881
Email: info@emcelfilters.co.uk | Web: www.emcelfilters.co.uk

CERTIFICATE OF TEST

Customer: Nuova Guseo s.r.l.

This is to certify that the item manufactured to your

Order No: 1372

Drawing No: E2234-40 Gr135 Issue 1

Product Description: Cylindrical Leaf Seal HEPA Filter

EMCEL Batch No: 47235.01

Serial No: 47235-01-01

Has been volumetrically tested to BS EN ISO 14644 Part 3 using an aerosol of Ondina oil

Aerosol Airflow Test Rate	74 cfm
Type Of Aerosol	Thermally generated poly dispersed ondina el oil
Challenge	34 µg/l
Penetration	0.0022 %
Efficiency	99.9978 %
Tested By	A. Macias
Date of Test	08/02/18
Instrument No	Smoke Generator P636, Photometer P685
Required Efficiency	99.995 %
Pass/Fail	PASS

Signed

Mr J D Robson
Quality Assurance Manager

Original to customer, copy to be retained by EMCEL Filters Limited. Details of results will be filed by batch number and held for 3 years.

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Tel: (01403) 253215 | Fax: (01403) 259881
Email: info@emcelfilters.co.uk | Web: www.emcelfilters.co.uk

CERTIFICATE OF TEST

Customer: Nuova Guseo s.r.l.

This is to certify that the item manufactured to your

Order No: 1372

Drawing No: E2234-40 Gr134 Issue 1

Product Description: Cylindrical Leaf Seal HEPA Filter

EMCEL Batch No: 47235.03

Serial No: 47235-03-01

Has been volumetrically tested to BS EN ISO 14644 Part 3 using an aerosol of Ondina oil

Aerosol Airflow Test Rate	160 cfm
Type Of Aerosol	Thermally generated poly dispersed ondina el oil
Challenge	46 µg/l
Penetration	0.0037 %
Efficiency	99.9963 %
Tested By	A. Macias
Date of Test	08/02/18
Instrument No	Smoke Generator P636, Photometer P685
Required Efficiency	99.995 %
Pass/Fail	PASS

Signed

Mr J D Robson
Quality Assurance Manager

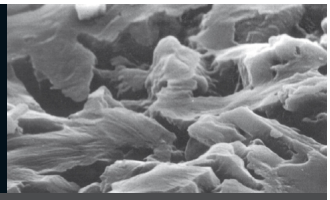
Original to customer, copy to be retained by EMCEL Filters Limited. Details of results will be filed by batch number and held for 3 years.

EMCEL Filters Limited is proud to be affiliated with:

Annex 5: Carbon filter specification sheet

Norit Electronic Version

Datasheet



Gas & Air

Norit R 2030 CO2

Norit R 2030 CO2 is a steam activated extruded carbon with a diameter of 3 mm. Due to the superior mechanical hardness and favourable adsorption properties, this is an excellent carbon type for the removal of carbon dioxide out of cold storage warehouses.

SPECIFICATIONS

Butane adsorption at p/p_0 = 0.1	**min. 13**	**g/100 g**
Butane adsorption at p/p_0 = 0.1	**max. 18**	**g/100 g**
Abrasion index	**max. 8**	**mg/min**
Moisture (as packed)	**max. 5**	**mass-%**

GENERAL CHARACTERISTICS

Butane adsorption at p/p_0 = 0.1	16	g/100 g
Total surface area (B.E.T.)	800	m^2/g
Apparent density	520	kg/m^3
Ball-pan hardness	99.9	-
Abrasion index	3	mg/min
Particle size > 2.36 mm	99	mass-%
Moisture (as packed)	1	mass-%
Ignition temperature, above	450	°C

Document No.

R203C

Product / Application

Extruded activated carbon

Version

13 July 2007

Norit Nederland BV

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P.O. Box 105
3800 AC Amersfoort
The Netherlands

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F: +31 33 46 17 429
E: sales@norit.com
I: www.norit-ac.com

NOTES

1 All analyses based on Norit Standard Test Methods (NSTM)
2 Specifications are guaranteed values based on lot to lot quality control, as covered by Norit's ISO 9001:2000 certification.
3 General characteristics reflect average values of product quality.
4 Detailed information on **pressure drop characteristics** in air can be found in Technical Bulletin TB 136: Pressure drop characteristics of Norit extruded activated carbon grades.

PACKAGING

Norit R 2030 CO2 is available in:
- Polyethylene bags of 25 kg, 44 bags per pallet, stretch wrapped on 115 x115 cm pallets (1100 kg net weight per pallet)

Product availabilities depend on the type of packaging.

This datasheet (Issue 13 July 2007) replaces previous issues.